Thermal Process Units and TPU Baghouse PM and Lead Emissions Test Report

Behr Iron & Metal – Rockford, Illinois

October 17, 2014

R11379

Prepared for:
Behr Iron & Metal
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Rockford, Illinois 61104
Attn: Mr. Ron Coupar – EHS Manager

Submitted To:
Illinois Environmental Protection Agency
Division of Air Pollution Control
Compliance Enforcement Section (#40)
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1.0 INTRODUCTION

Behr Iron & Metal (Behr) retained Mostardi Platt to perform lead (Pb) and particulate (PM) emission testing on the Thermal Process Units and the TPU Baghouse. Three (3) 2-hour runs were performed at each sampling location in accordance with USEPA Methods 5 and 12, Title 40, *Code of Federal Regulations*, Part 60, Appendix A. See Figure 3 for sampling point locations.

Testing included collecting operational data for each run, such as damper position and amount of processed material and evaluating PM and Lead emissions at each sampling location.

1.1 Facility Location

Behr Iron & Metal is located at 1100 Seminary Street in Rockford, Illinois as shown in Figure 1. A facility map is presented in Figure 2. Facility contact information is provided in Section 1.2 below.

1.2 Facility Contact Information

Business Name:	Behr Iron & Metal
Source Location:	1100 Seminary Street– Rockford, Illinois 61104 Rockford Northwest Township - Winnebago County Illinois
Latitude/Longitude:	42° 14’ 28.48” N / 89° 06” 00.15” W – Front Gate
Office/Mailing Address:	1100 Seminary Street, Rockford, Illinois 61104
Facility Contact:	Mr. Ron Coupar – EHS Manager 815-987-2770 – rcoupar@behrim.com
IEPA Site ID No.:	201030AYB
SIC Code:	5093 – Scrap and Waste Materials
NAICS Code:	423930 – Recyclable Material Merchant Wholesalers

1.3 Test Participants

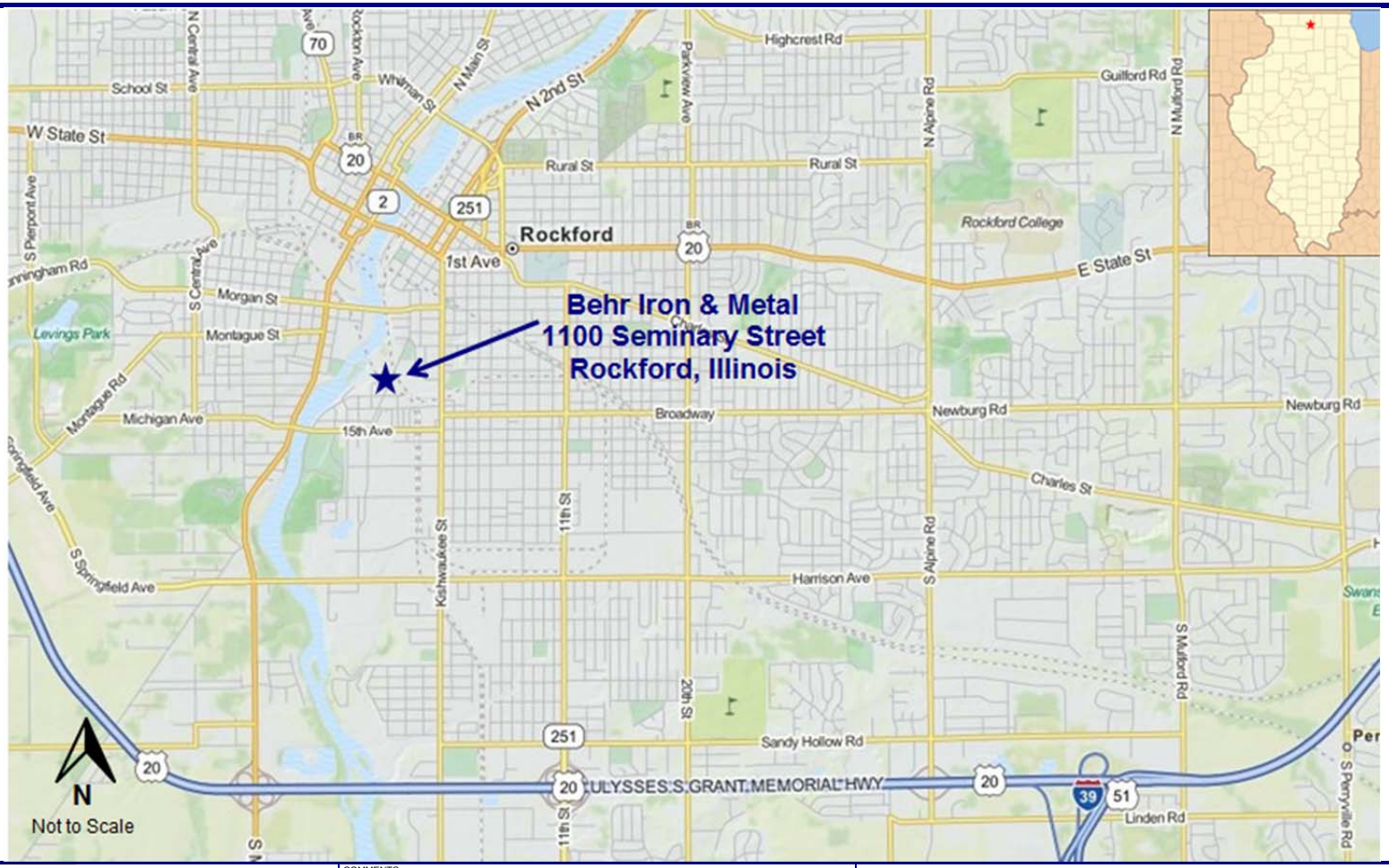
Behr’s technical representative for this test program was Mr. Ron Coupar, EHS Manager. Questions regarding the physical operations at the facility may be directed to Mr. Coupar at (815) 987-2770.

Behr retained Mostardi Platt for conducting sample collection and emission sample analyses.

Questions regarding this test report may be directed to Mr. John Pinion at (630) 393-9000.

1.3.1 IEPA Representatives

Although Behr sent out notices of TPU testing to IEPA, testing of the TPU Baghouse was not a permitted requirement and was therefore not witnessed by a IEPA representative.



RK & Associates, Inc. 2S631 ROUTE 59, SUITE B WARRENVILLE, IL 60555 630-393-9000	COMMENTS: Thermal Process Units and TPU Baghouse PM and Lead Emissions Test Report		Site Location Map Behr Iron & Metal -Rockford, Illinois		FIGURE 1
	DRAWN BY::	APPROVED BY:: JGP	PROJECT NUMBER R11379	DATE DRAWN: 10/2014	REVISED DATE

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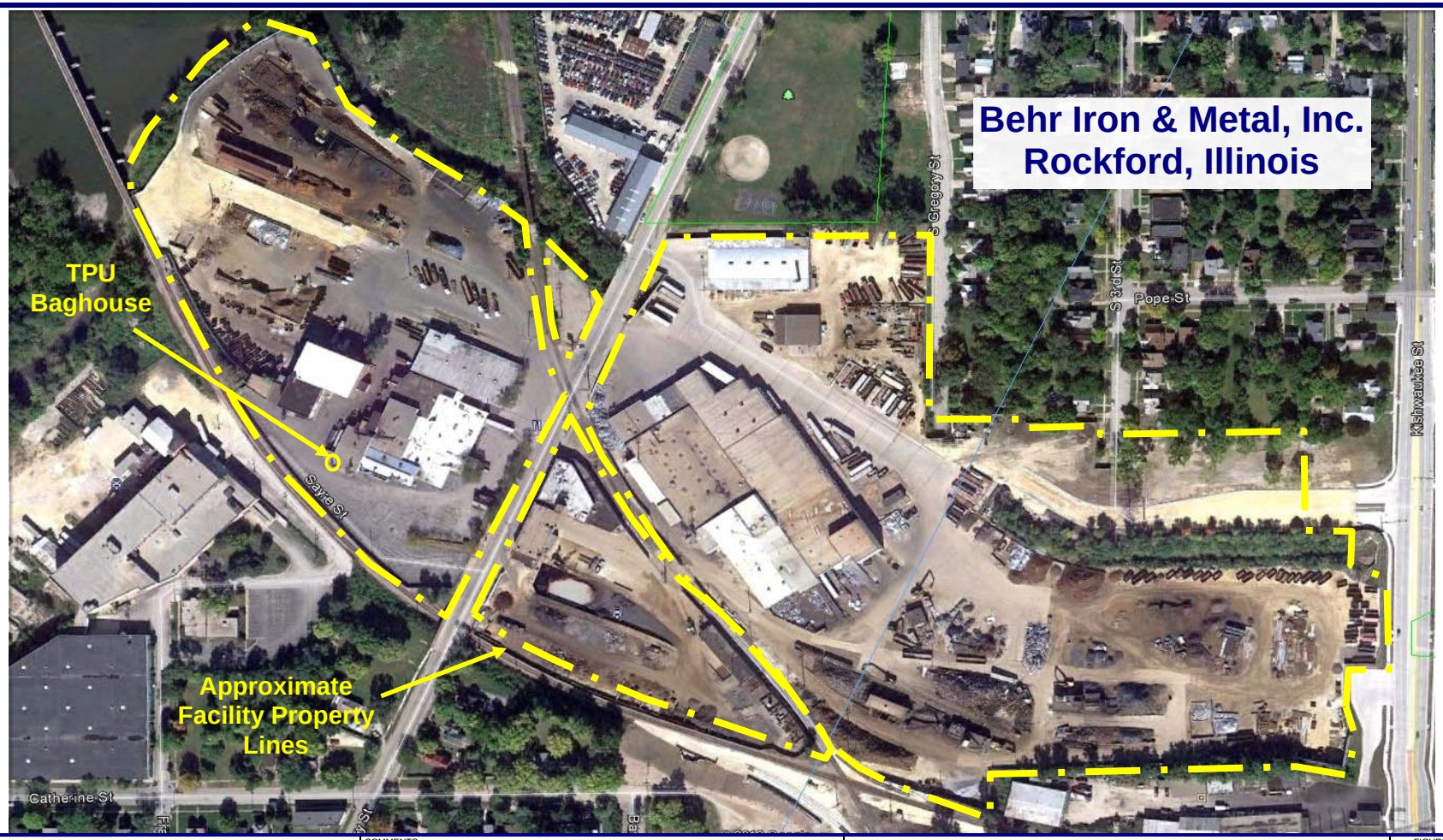

RK & Associates, Inc. 2S631 ROUTE 59, SUITE B WARRENVILLE, IL 60555 630-393-9000	COMMENTS: Thermal Process Units and TPU Baghouse PM and Lead Emissions Test Report	**Facility Map** **Behr Iron & Metal** **1100 Seminary Street - Rockford, Illinois**		FIGURE: 2
	DRAWN BY: JP	APPROVED BY:	PROJECT NUMBER: R11379-2.2	DATE: 10/2014	REVISED DATE:

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2.0 PROCESS DESCRIPTION

The following units are connected to the TPU Baghouse (Control Point No.: 0006):

- Thermal Process Units 1 & 2 (Emission Point No.: 0013)
- Rotary Dryer (Emission Point No.: 0014)
- Oxidizer
- Evaporative Quench

Thermal Process Units 1 and 2 are the only sources of lead emissions connected to the TPU Baghouse.

Thermal Process Units 1 and 2 were operated during this test under typical operating conditions (temperature, differential pressure, and throughput). PM and Pb emissions at the inlet of the TPU Baghouse include emissions from these sources. The Rotary Dryer was not operated during this test.

2.1 Thermal Process Units 1 and 2

Scrap wire of various sizes and types are placed in metal baskets within the thermal process units. The primary material processed in the TPUs is lead shielded copper cable (40% Pb by weight). Natural gas burners are used to heat the cable in a reduced oxygen atmosphere to volatize and remove the insulating layers. Melted lead and ash is collected for further processing.

Negative pressure from baghouse fan pulls process air and emissions from the TPUs through a common thermal oxidizer, evaporative quench chamber and baghouse. System is completely enclosed.

Data collected during testing of the Thermal Process Units includes:

- Charge Weight
- Process Length
- Chamber Temperature
- Chamber Pressure Reading

See Table 2-1 for TPU production data summary.

Table 2-1
TPU Production Data from Comliance Demonstration Testing
Behr Iron & Metal- Rockford Facility

Parameter	Unit	TPU-A		TPU-B	
		Charge 1	Charge 2	Charge 1	Charge 2
Start Time		10:40	14:20	9:10	12:20
Stop Time		12:45	16:25	10:40	14:20
Process Time	hrs	2.07	2.08	1.50	2.00
Average Chamber Temp.	°F	1,197	1,366	1,138	1,173
Weight	LB	1,224	1,212	1,198	1,258
Weight Processed	ton/hr	0.30	0.29	0.40	0.31
Average Process Rate	ton/hr		0.29		0.36

2.2 Thermal Oxidizer

The exhaust gas from the TPU units passes through the Thermal Oxidizer. Contaminants within the exhaust gas react with oxygen in a temperature controlled environment to destroy VOCs before discharging it back into the atmosphere. What is released is an innocuous emission of CO_2 and water vapor.

Thermal Oxidizer temperature readings were recorded during testing of TPU 1 & 2 and the TPU Baghouse; see Table 2-2 below. Chamber temperature must be maintained above 1,450°F during material processing.

Table 2-2
Average Thermal Oxidizer Temperature Readings
Behr Iron & Metal - Rockford Facility

Parameter	Run 1	Run 2	Run 3	Average
Temperature (°F)	1,587	1,615	1,524	1,575

2.3 Evaporative Quench

The hot exhaust stream from the Oxidizer passes through the quench prior to entering the Baghouse. The hot exhaust gas is cooled by the evaporation of water in the exhaust gas. Exhaust gas to the Baghouse may not exceed 500°F.

Evaporative Quench temperature readings were recorded during testing of TPU 1 & 2 and the TPU Baghouse; see Table 2-3 below.

Table 2-3
Average Evaporative Quench Temperature Readings
Behr Iron & Metal - Rockford Facility

Parameter	Run 1	Run 2	Run 3	Average
Temperature (°F)	441	444	447	444

2.4 TPU Baghouse

Contaminated gas enters the baghouse where an inlet baffle evenly distributes the gas to the filter bags permitting the heavier particulate to drop out into the hopper. The lighter remaining particles are carried with the gas stream toward the filter bags.

As the gas passes through the filter bags, particulate is collected on the outside surface of the bags and the particulate free gases are exhausted from the unit through the clean air plenum and into the ductwork to be exhausted through the stack.

Collected dust is deposited in the pyramidal hopper and then discharged through a rotary airlock.

Data collected during testing of the TPU Baghouse for each run includes:

- Pressure Drop
- Temperature

See Table 2-4 for a summary of TPU Baghouse operation data.

Table 2-4
TPU Bahouse Operating Data
Behr Iron & Metal - Rockford Facility

Parameter	Run 1	Run 2	Run 3	Average
Baghouse Temp. (°F)	354	349	362	355
Exhaust Stack Temp. (°F)	282	289	344	305
Pressure Drop (inches H2O)	2.11	2.49	3.59	2.73

2.5 Sampling Locations

Emission sampling locations of the TPU Baghouse and the units listed above are as follows:

- TPU Baghouse Inlet
- TPU Baghouse Outlet

See Figure 3 for sampling location and unit configuration.

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3.0 TEST RESULTS

The following sections provide a summary of testing results from the Thermal Process Units and the TPU Baghouse.

The data from each run of PM and Lead emission testing of the Thermal Process Units and the TPU Baghouse is presented in Table 3-3 below.

Sampling locations of PM and Lead emission testing of the Thermal Process Units and the TPU Baghouse are shown in Figure 3 and includes a summary table of data averaged from the three test runs. Damper positions depicted in Figure 3 indicate if they were open or shut during testing.

PM and Lead Testing of the TPUs and TPU Baghouse occurred while the emission units were under typical operating conditions (throughput, differential pressure, and temperature). The rotary dryer was not operated during testing.

PM and lead emission at the inlet of the baghouse demonstrate uncontrolled emission from TPUs 1 and 2. Emissions at the baghouse exhaust stack represent controlled TPU PM and lead emissions.

3.1 Methods

Particulate emissions were evaluated using Test Methods 1 through 5 from 40 CFR Appendix A-3 to Part 60. Lead emissions were evaluated using Test Method 12 from 40 CFR Appendix A-5 to Part 60.

3.2 Demonstrated Emission Factor

PM and Lead emission factors for the TPU Baghouse are based upon weight of cable processed and length of processing time within the TPUs coupled with baghouse PM and Lead emissions evaluated using the methods mentioned above.

The following sections present the demonstrated PM and Lead emission factors for the TPU Baghouse Inlet and Exhaust Stack representing uncontrolled and controlled PM and lead emissions; respectively.

3.2.1 TPU Baghouse Inlet

Table 3-1a summarizes the weight of cable processed and length of processing time within the TPUs that correspond to the TPU Baghouse Inlet test runs.

Table 3-1a
TPU Baghouse Inlet Operating Data
Behr Iron & Metal - Rockford Facility

Parameter	Run 1	Run 2	Run 3	Average
Start Time	9:20	11:55	14:20	
Stop Time	11:25	13:58	16:24	
Process Time (hrs)	2.08	2.05	2.07	2.07
Weight Processed (Lb)	1554	1590	1212	1452
LB/hr	746	776	586	703
ton/hr	0.37	0.39	0.29	0.35

Table 3-1b presents the uncontrolled TPU PM and Lead emission factors associated with the TPU Baghouse Inlet.

Table 3-1b
TPU Baghouse Inlet
Uncontrolled TPU PM and Pb Emissions and Emission Factor

Parameter			Run 1	Run 2	Run 3	Average
Process Time		hrs	2.08	2.05	2.07	2.07
Annual Operation		hrs/yr	8760			
Weight Processed (cable)		LB	1208	1487	1212	1302
Weight Processed (cable)		LB/hr	579.84	725.29	586.45	630.53
Weight Processed (cable)		tph	0.29	0.36	0.29	0.32
Weight Processed (cable)		tpy	2,539.70	3,176.77	2,568.66	2,761.71
Uncontrolled	PM Emissions	lb/hr	0.738	0.704	0.849	0.764
	PM Emission Factor	lb PM/ton	2.546	1.941	2.895	2.461
Uncontrolled	Pb Emissions	lb/hr	0.057	0.061	0.076	0.065
	Pb Emission Factor	lb Pb/ton	0.196	0.168	0.258	0.207

3.2.2 TPU Baghouse Exhaust Stack

Table 3-2a summarizes the weight of cable processed and length of processing time within the TPUs that correspond to the TPU Baghouse Exhaust Stack test runs.

Table 3-2a
TPU Baghouse Exhaust Stack Operating Data
Behr Iron & Metal - Rockford Facility

Parameter	Run 1	Run 2	Run 3	Overall
Start Time	9:20	11:55	14:20	
Stop Time	11:27	13:58	16:23	
Process Time (hrs)	2.12	2.05	2.05	2.07
Weight Processed (Lb)	1603	1590	1212	1469
LB/hr	758	776	591	708
ton/hr	0.38	0.39	0.30	0.35

Table 3-2b presents the controlled TPU PM and Lead emission factors associated with the TPU Baghouse Exhaust Stack.

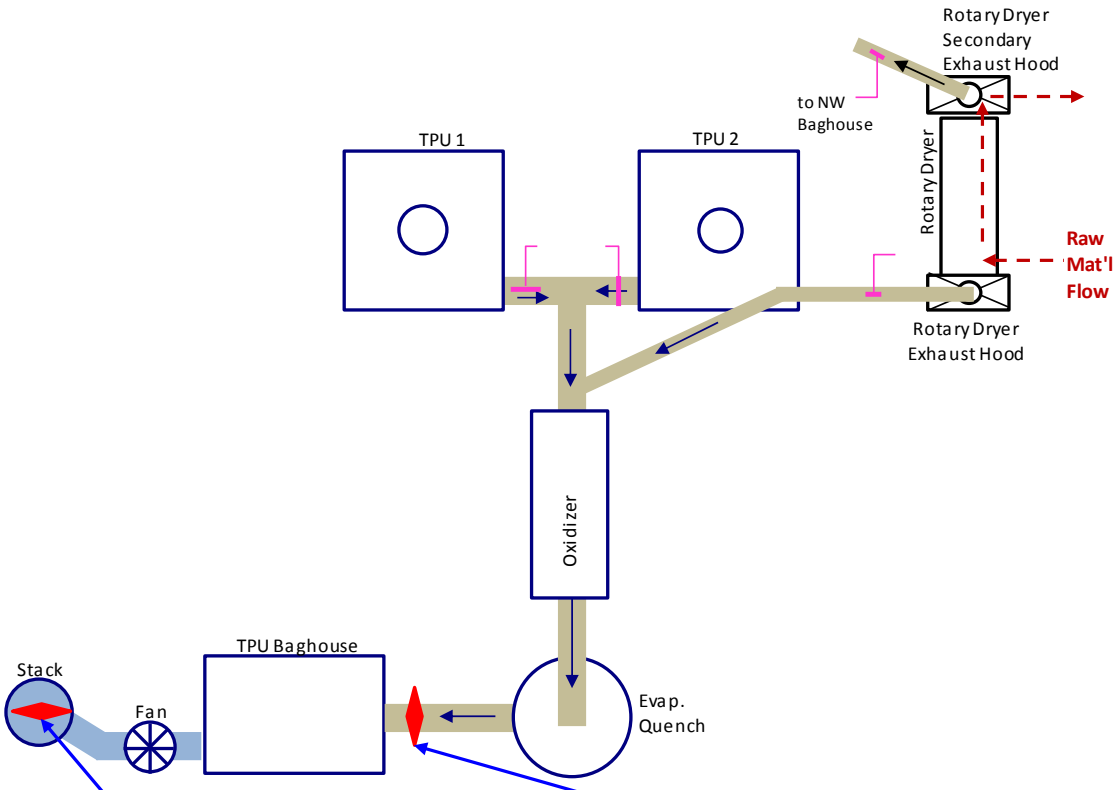
Table 3-2b
TPU Baghouse Exhaust Stack
Controlled TPU PM and Pb Emissions and Emission Factor

Parameter			Run 1	Run 2	Run 3	Average
	Process Time	hrs	2.12	2.05	2.05	2.07
	Annual Operation	hrs/yr	8760			
	Weight Processed (cable)	LB	1209	1487	1212	1302
	Weight Processed (cable)	LB/hr	570.99	725.29	591.22	629.17
	Weight Processed (cable)	tph	0.29	0.36	0.30	0.31
	Weight Processed (cable)	tpy	2,500.93	3,176.77	2,589.54	2,755.75
Controlled	PM Emissions	lb/hr	0.059	0.020	0.072	0.050
	PM Emission Factor	lb PM/ton	0.2067	0.0552	0.2436	0.1685
	PM Control Efficiency	%	93%			
Controlled	Pb Emissions	lb/hr	0.00550	0.00720	0.00780	0.00680
	Pb Emission Factor	lb Pb/ton	0.0193	0.0199	0.0264	0.0218
	Pb Control Efficiency	%	90%			

Summary of PM and Lead Emissions Testing of Thermal Processing Units Controlled by an Oxidizer, Evaporative Quench and Baghouse Behr Iron & Metal - Rockford, Illinois

Parameter	Units	TPU Baghouse Inlet Behr Iron & Metal - Rockford, Illinois				TPU Baghouse Outlet Behr Iron & Metal - Rockford, Illinois			
		Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Source Condition		Normal	Normal	Normal		Normal	Normal	Normal	
Date		10/2/2014	10/2/2014	10/2/2014		10/2/2014	10/2/2014	10/2/2014	
Run Start Time		9:20	11:55	14:20		9:20	11:55	2:20	
Run End Time		11:25	13:58	16:24		11:27	1:58	4:23	
		Stack Conditions				**Stack Conditions**			
Average Gas Temperature	°F	398.9	416.3	427.9	414.4	281.6	284.7	345.8	304
Flue Gas Moisture	% Vol	28.10%	19.40%	27.00%	24.80%	19.70%	26.30%	21.80%	22.60%
Average Flue Pressure	in Hg	28.96	28.96	28.96	28.96	29.33	29.33	29.33	29.33
Gas Sample Volume	dscf	76.665	85.005	89.48	83.717	76.65	76.267	103.628	85.515
Average Gas Velocity	ft/sec	26.586	29.157	31.567	29.103	38.701	39.441	55.428	44.523
Gas Volumetric Flow Rate	acfm	3,837	4,208	4,556	4,200	4,103	4,182	5,877	4,721
Gas Volumetric Flow Rate	dscfm	1,642	1,977	1,913	1,844	2,300	2,141	2,952	2,464
Gas Volumetric Flow Rate	scfm	2,283	2,454	2,622	2,453	2,864	2,906	3,775	3,182
Average % CO_2	% Vol dry	3.8	4.3	3.6	3.9	2.1	2.4	2.9	2.5
Average % O_2	% Vol dry	15.4	14.7	14.4	14.8	17.9	16.5	16	16.8
Isokinetic Variance		108.4	99.8	108.6	105.6	99.4	106.2	104.7	103.4
		Filterable Particulate Matter (Method 5)				**Filterable Particulate Matter (Method 5)**			
Grams Collected	gr	0.2607	0.2287	0.3004	0.2633	0.0148	0.0055	0.0192	0.0132
PM Concentration	grains/acfm	0.0225	0.0195	0.0217	0.0212	0.0017	0.0006	0.0014	0.0012
PM Concentration	grains/dscf	0.0525	0.0415	0.0518	0.0486	0.003	0.0011	0.0029	0.0023
PM Mass Emission Rate	lb/hr	0.738	0.704	0.849	0.764	0.059	0.02	0.072	0.05
		Lead Emissions Data (Method 12)				**Lead Emissions Data (Method 12)**			
Grams Collected	gr	0.0205481	1.98E-02	0.026748	0.022381	0.0013981	0.0019381	0.002078	1.81E-03
Lead Concentration	ppb	1097.983	956.523	1224.581	1093.029	74.722	104.102	82.151	86.992
Lead Concentration	ug/dscm	9465.18	8245.72	10556.52	9422.47	644.14	897.41	708.18	749.91
Lead Mass Emission Rate	lb/hr	0.05682	0.0611	0.0756	0.065	0.0055	0.0072	0.0078	0.0068

Figure 3
Sample Locations of PM and Lead Emissions Testing of Thermal Process Units Controlled by a Thermal Oxidizer, Evaporative Quench and Baghouse
Behr Iron & Metal - Rockford, Illinois



TPU Baghouse Exhaust Stack	Parameter	Units	TPU Baghouse Inlet
304.0	Average Gas Temperature	°F	414.4
85.52	Average Gas Velocity	ft/sec	83.72
22.60%	Flue Gas Moisture	% Vol	24.80%
2,464	Gas Volumetric Flow Rate	dscfm	1,844
0.0023	PM Loading	grains/dscf	0.0486
0.0500	PM Emissions	lb/hr	0.764

8,760		hrs/yr	
Permit Limit	PM Emissions	lb/hr	0.2400
		tpy	1.0512

93.46%	PM Removal Efficiency of Cyclone/Baghouse

0.0003	Pb Loading	grains/dscf	0.0041
0.0068	Pb Emissions	lb/hr	0.0650

89.54%	Lead Removal Efficiency of Cyclone/Baghouse

3.3 Permitted Emission Rates

Table 3-4 presents the demonstrated emission rates from PM and lead emission testing of the thermal process units. Table 3-5 presents current facility permitted emission rates. Comparison of the two tables shows the TPU PM emission rates are below permitted levels.

Table 3-4
Thermal Process Units Demonstrated PM and Lead Emission Rates
Behr Iron & Metal - Rockford Facility

		Demonstrated Emission Rate				Demonstrated	
	Demonstrated	Uncontrolled		Controlled		Control Efficiency	
	Throughput	lb/hr		lb/hr		%	
Emission Unit	tph	PM	Pb	PM	Pb	PM	Pb
TPU 1&2	0.320	0.764	0.065	0.050	0.007	93%	90%

Table 3-5
Facility Permitted Emission Rates
Lifetime Operating Permit (No.: 85030079)
Behr Iron & Metal - Rockford Facility

Emission Unit	Permitted Throughput (tons/hr)	hr/yr	(tpy)	Permitted Emissions PM (lb/hr)	(tpy)	Lead (lb/hr)	(tpy)	Emission Factor Based on Permitted Throughput and Emissions PM (lb/ton)	Lead (lb/ton)
Rotary Dryer	1.06	8,760	9,286	0.52	2.30	-	-	0.4906	-
TPU 1	0.25	8,760	2,190	0.24	1.06	-	-	0.9600	-
TPU 2	0.25	8,760	2,190	0.24	1.06	-	-	0.9600	-
Sweeco Sand Separator	0.25	8,760	2,190	0.24	1.06	-	-	0.9600	-
Foundry Sand Separator	0.75	8,760	6,570	0.44	1.91	-	-	0.5867	-
Lead Pot 2	1.05	8,760	9,198	0.52	2.28	0.0021	0.0100	0.4952	0.0020
Lead Pot 3	1.05	8,760	9,198	0.52	2.28	0.0021	0.0100	0.4952	0.0020
Crucible Furnace	0.225	8,760	1,971	0.23	1.00	0.0000	0.0000	1.0222	-
Brass Sorting Table	0.310	8,760	2,716	0.27	1.19	0.0140	0.0610	0.8710	0.0452
Scrap Hammermill w/ Cyclone	9.06	8,760	79,366	1.32	5.78	-	-	0.1457	-
Babbit Pot	0.750	8,760	6,570	0.44	1.91	0.0015	0.0066	0.5867	0.0020
Lead Recovery Rotary Furnace	1.00	95	95	0.700	0.034	0.2000	0.0080	70	16
					21.8635		0.0956		

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Thermal Process Units and TPU Baghouse PM and Lead Emissions Test Report

Behr Iron & Metal - Rockford, Illinois

R11379

October 17, 2014

APPENDIX A
MOSTARDI PLATT TEST REPORT

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Particulate Matter and Lead Emissions Compliance Test Report

Behr Iron and Metal
Rockford Facility
TPU Baghouse System
Rockford, Illinois
Report No. M143903C
October 2, 2014

Particulate Matter and Lead Emissions Compliance Test Report

Behr Iron and Metal
Rockford Facility
TPU Baghouse System
Rockford, Illinois
October 2, 2014

Report Submittal Date
November __, 2014

Report No. M143903C

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1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted a particulate matter and lead emissions test program for Behr Iron and Metal at their Rockford facility on the TPU Baghouse system in Rockford, Illinois on October 2, 2014. This report summarizes the results of the test program and test methods used.

The test locations, test date, and test parameters are summarized below.

TEST INFORMATION		
Test Locations	**Test Date**	**Test Parameters**
TPU Baghouse Inlet	October 2, 2014	Filterable Particulate Matter (FPM) and Lead (Pb)
TPU Baghouse Outlet		

The purpose of the test program was to determine FPM and Pb emissions and removal efficiency of the TPU Baghouse. Selected results of the test program are summarized below. A complete summary of emission test results follows the narrative portion of this report.

TEST RESULTS SUMMARY		
Test Location	**Test Parameter**	**Emission Rate, lb/hr**
TPU Baghouse Inlet	FPM	0.764
	Pb	0.0650
TPU Baghouse Outlet	FPM	0.050
	Pb	0.0068
REMOVAL EFFICIENCY SUMMARY		
Filterable Particulate Removal Efficiency, %		
93.5		
Lead Removal Efficiency, %		
89.5		

The Stationary Source Audit Sample Program audit sample was obtained from ERA and submitted for analysis to Maxxam Analytical. The result of the audit sample was compared to the assigned value by ERA and found to be acceptable. The audit sample result and evaluation is appended to this report.

The identifications of the individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	**Address**	**Contact**
Test Coordinator	RK & Associates, Inc. 2S631 Route 59, Suite B Warrenville, Illinois 60555	Mr. John Pinion Associate Engineer (630) 393-9000 x 208 jpinion@rka-inc.com
Test Facility	Behr Iron & Metal 1100 Seminary Street Rockford, Illinois 61104	Mr. Ron Coupar Environmental Manager (815) 987-2770 rcoupar@behrim.com
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Stuart Sands Project Manager (630) 993-2100 (phone) ssands@mp-mail.com

The test crew consisted of Messrs. J. Howe, B. Terra, M. Yanz, T. Nelson, and S. Sands of Mostardi Platt.

2.0 TEST METHODOLOGY

Emission testing was conducted following the methods specified in 40CFR60, Appendix A. A schematic of the test section diagrams are found in Appendix B and schematics of the sampling trains used are included in Appendix C. Calculation nomenclature and sample calculations are included in Appendix D. Laboratory analysis data are found in Appendix E. Copies of electronic data for each test run are included in Appendix F and field data sheets are found in Appendix G.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1. The characteristics of the measurement location are summarized below.

TEST POINT INFORMATION				
Test Location	**Upstream Diameters**	**Downstream Diameters**	**Test Parameters**	**Number of Sampling Points**
TPU Baghouse Inlet	>0.5	>2.0	FPM, Pb	24
TPU Baghouse Outlet	6.5	10.0		24

Absence of cyclonic flow tests were performed prior to testing at each location and each location passed.

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating volumetric flow rate and particulate and lead emission rates on a lb/hr basis. An S-type pitot tube, differential pressure gauge, thermocouple and temperature readout were used to determine gas velocity at

each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 3A Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Flue gas molecular weight was determined in accordance with Method 3A. Servomex analyzers were used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H and copies of the gas cylinder certifications are found in Appendix I.

Method 5 Filterable Particulate Matter Determination

Flue gas filterable particulate matter concentrations and emission rates were determined in accordance with Method 5. The probe and filter housing were maintained at a temperature of 248^{o}F +/- 25^{o}F. An Environmental Supply Company, Inc. sampling train was used to sample flue gas at an isokinetic rate. Four impingers were utilized, the first two each containing 100 ml of 0.1N Nitric Acid (HNO_3), the third remained empty, and the fourth contained approximately 200 grams of silica gel. The impingers were weighed prior to and after each test run in order to determine moisture content of the stack gas. A minimum of 60 dry standard cubic feet was sampled for each run.

Particulate matter in the sample probe was recovered utilizing acetone; three passes of the probe brush through the entire probe was performed, followed by a visual inspection of the acetone exiting the probe. The acetone solution exiting the probe was clear, and therefore the wash was considered complete. The nozzle was then removed from the probe and cleaned in a similar manner, utilizing an appropriately sized nozzle brush. The filter and filter housing were recovered in a clean area. The filter housing was washed a minimum of three times with acetone and inspected for cleanliness, and the filter was placed in its corresponding petri dish. All surfaces were then rinsed with 0.1 N HNO_3 following Method 12 procedures. The acetone wash and the filter were labeled and marked, then analyzed at the Mostardi Platt Laboratory by Mostardi Platt personnel in accordance with the Method. Upon completion of the particulate analyses, filters and dried acetone washes were sent to Maxxam Analytics for lead analysis. All sample data analysis, are found in Appendix E. All of the equipment used is calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 12 Lead Determination

Flue gas inorganic lead emissions were determined in accordance with Method 12. An Environmental Supply Company, Inc. sampling train was used to sample flue gas, in conjunction with the above described Method 5 particulate sampling. Analysis of the lead samples collected were, performed by Maxxam Analytics. Laboratory sample analysis data are included in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in the Appendix H.

3.0 TEST RESULT SUMMARIES

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Inlet
Test Method: 5/12

Source Condition	Normal	Normal	Normal	
Date	10/2/14	10/2/14	10/2/14	
Start Time	9:20	11:55	14:20	
End Time	11:25	13:58	16:24	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	398.9	416.3	427.9	414.4
Flue Gas Moisture, percent by volume	28.1%	19.4%	27.0%	24.8%
Average Flue Pressure, in. Hg	28.96	28.96	28.96	28.96
Gas Sample Volume, dscf	76.665	85.005	89.480	83.717
Average Gas Velocity, ft/sec	26.586	29.157	31.567	29.103
Gas Volumetric Flow Rate, acfm	3,837	4,208	4,556	4,200
Gas Volumetric Flow Rate, dscfm	1,642	1,977	1,913	1,844
Gas Volumetric Flow Rate, scfm	2,283	2,454	2,622	2,453
Average %CO_2 by volume, dry basis	3.8	4.3	3.6	3.9
Average %O_2 by volume, dry basis	15.4	14.7	14.4	14.8
Isokinetic Variance	108.4	99.8	108.6	105.6
Filterable Particulate Matter (Method 5)				
grams collected	0.2607	0.2287	0.3004	0.2633
grains/acf	0.0225	0.0195	0.0217	0.0212
grains/dscf	0.0525	0.0415	0.0518	0.0486
lb/hr	0.738	0.704	0.849	0.764
Lead (Pb) Emissions				
ug of sample collected	20,548	19,848	26,748	22,381
ppb	1,097.983	956.523	1,224.581	1,093.029
ug/dscm	9,465.18	8,245.72	10,556.52	9,422.47
lb/hr	0.0582	0.0611	0.0756	0.0650

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Outlet
Test Method: 5/12

Source Condition	Normal	Normal	Normal	
Date	10/2/14	10/2/14	10/2/14	
Start Time	9:20	11:55	2:20	
End Time	11:27	1:58	4:23	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	281.6	284.7	345.8	304.0
Flue Gas Moisture, percent by volume	19.7%	26.3%	21.8%	22.6%
Average Flue Pressure, in. Hg	29.33	29.33	29.33	29.33
Gas Sample Volume, dscf	76.650	76.267	103.628	85.515
Average Gas Velocity, ft/sec	38.701	39.441	55.428	44.523
Gas Volumetric Flow Rate, acfm	4,103	4,182	5,877	4,721
Gas Volumetric Flow Rate, dscfm	2,300	2,141	2,952	2,464
Gas Volumetric Flow Rate, scfm	2,864	2,906	3,775	3,182
Average %CO_2 by volume, dry basis	2.1	2.4	2.9	2.5
Average %O_2 by volume, dry basis	17.9	16.5	16.0	16.8
Isokinetic Variance	99.4	106.2	104.7	103.4
Filterable Particulate Matter (M5)				
grams collected	0.0148	0.0055	0.0192	0.0132
grains/acf	0.0017	0.0006	0.0014	0.0012
grains/dscf	0.0030	0.0011	0.0029	0.0023
lb/hr	0.059	0.020	0.072	0.050
Lead (Pb) Emissions				
ug of sample collected	1,398	1,938	2,078	1,805
ppb	74.722	104.102	82.151	86.992
ug/dscm	644.14	897.41	708.18	749.91
lb/hr	0.0055	0.0072	0.0078	0.0068

4.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to Behr Iron and Metal. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

CERTIFICATION

As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT

_____ Program Manager
Stuart T. Sands

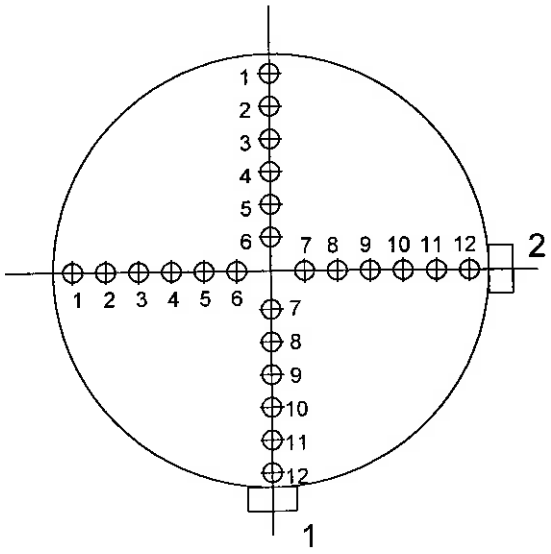
_____ Quality Assurance
Eric L. Ehlers

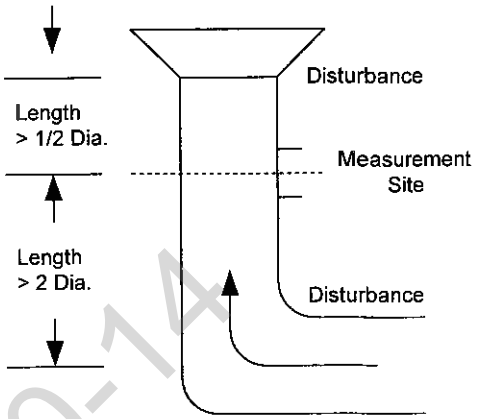
APPENDICES

Appendix A - Plant Operating Data

Appendix B - Test Section Diagrams

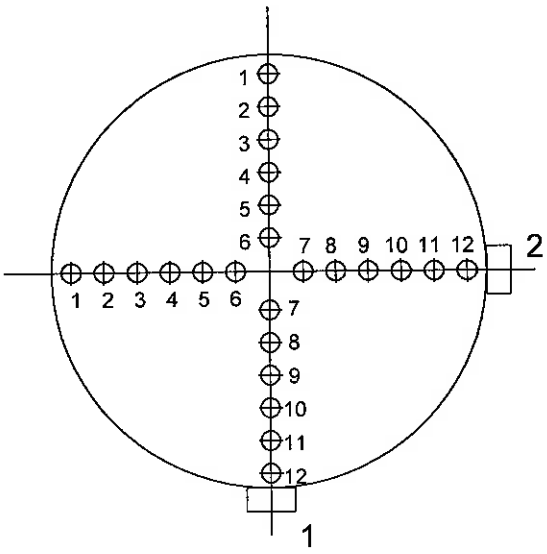
EQUAL AREA TRAVERSE FOR ROUND DUCTS

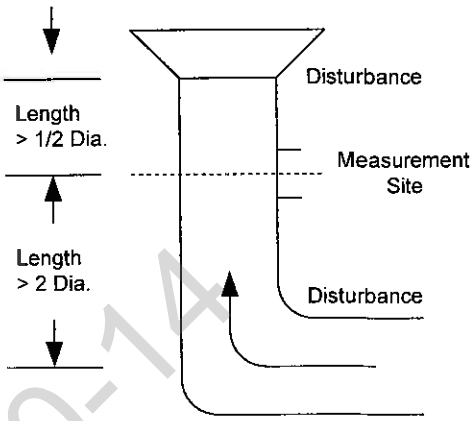




Job:	Behr Iron & Metal Rockford, Illinois
Date:	October 2, 2014
Test Location:	TPU Baghouse Inlet
Duct Diameter:	1.75 Feet
Duct Area:	2.405 Square Feet
No. Points Across Diameter:	12
No. of Ports:	2
Port Length:	6.0 Inches

EQUAL AREA TRAVERSE FOR ROUND DUCTS

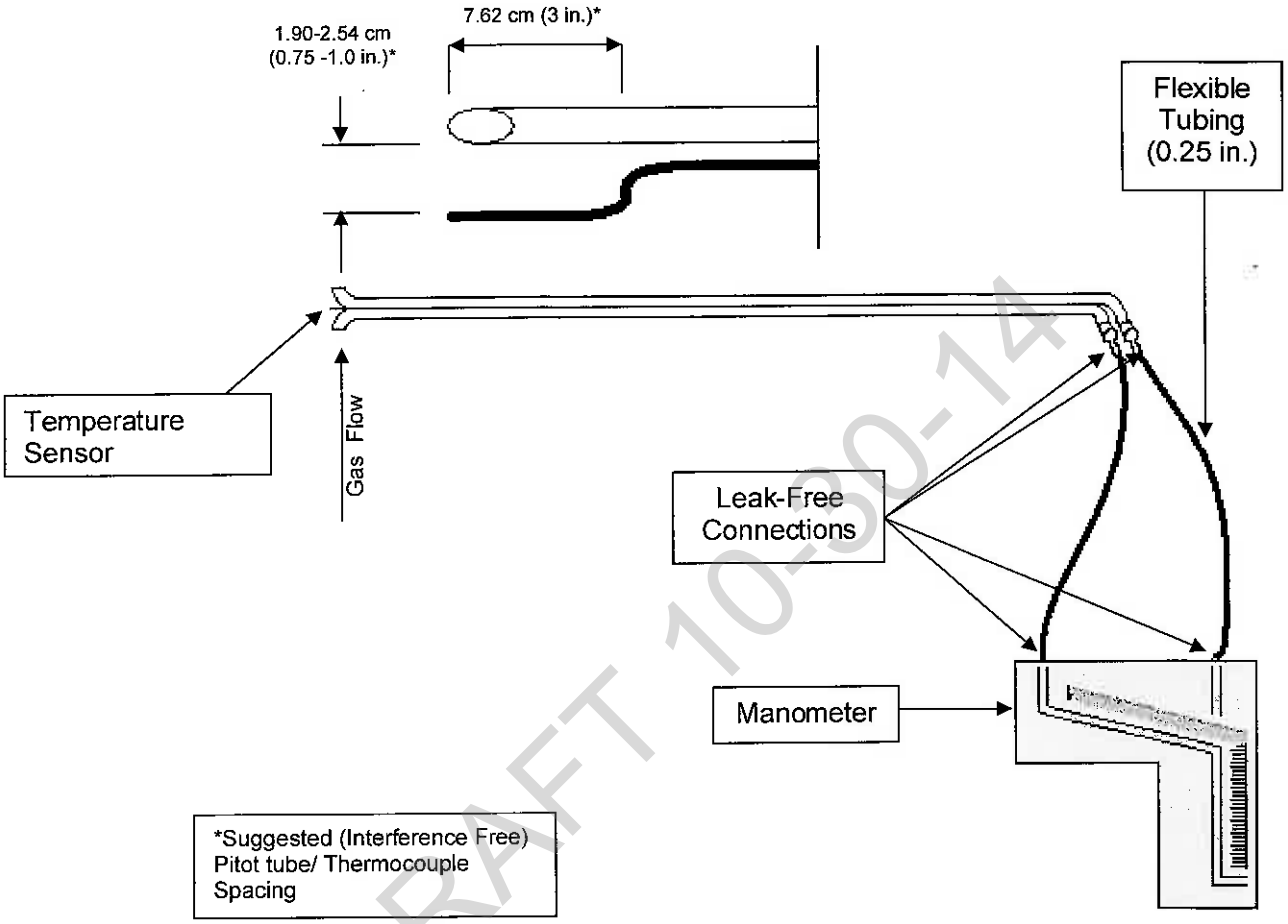




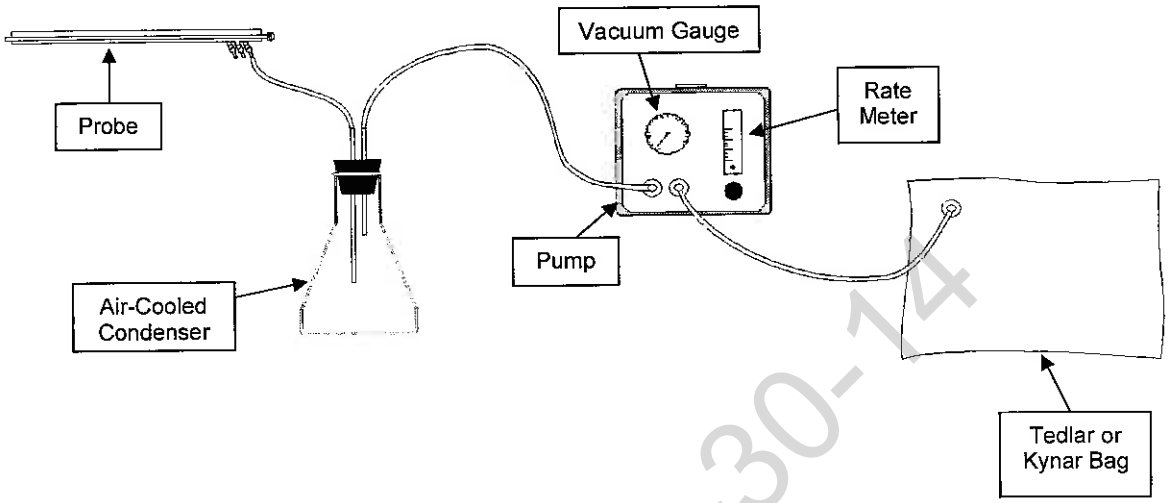
Job:	Behr Iron & Metal Rockford, Illinois
Date:	October 2, 2014
Test Location:	TPU Baghouse Outlet
Duct Diameter:	1.5 Feet
Duct Area:	1.767 Square Feet
No. Points Across Diameter:	12
No. of Ports:	2
Port Length:	6.0 Inches

Appendix C - Sample Train Diagrams

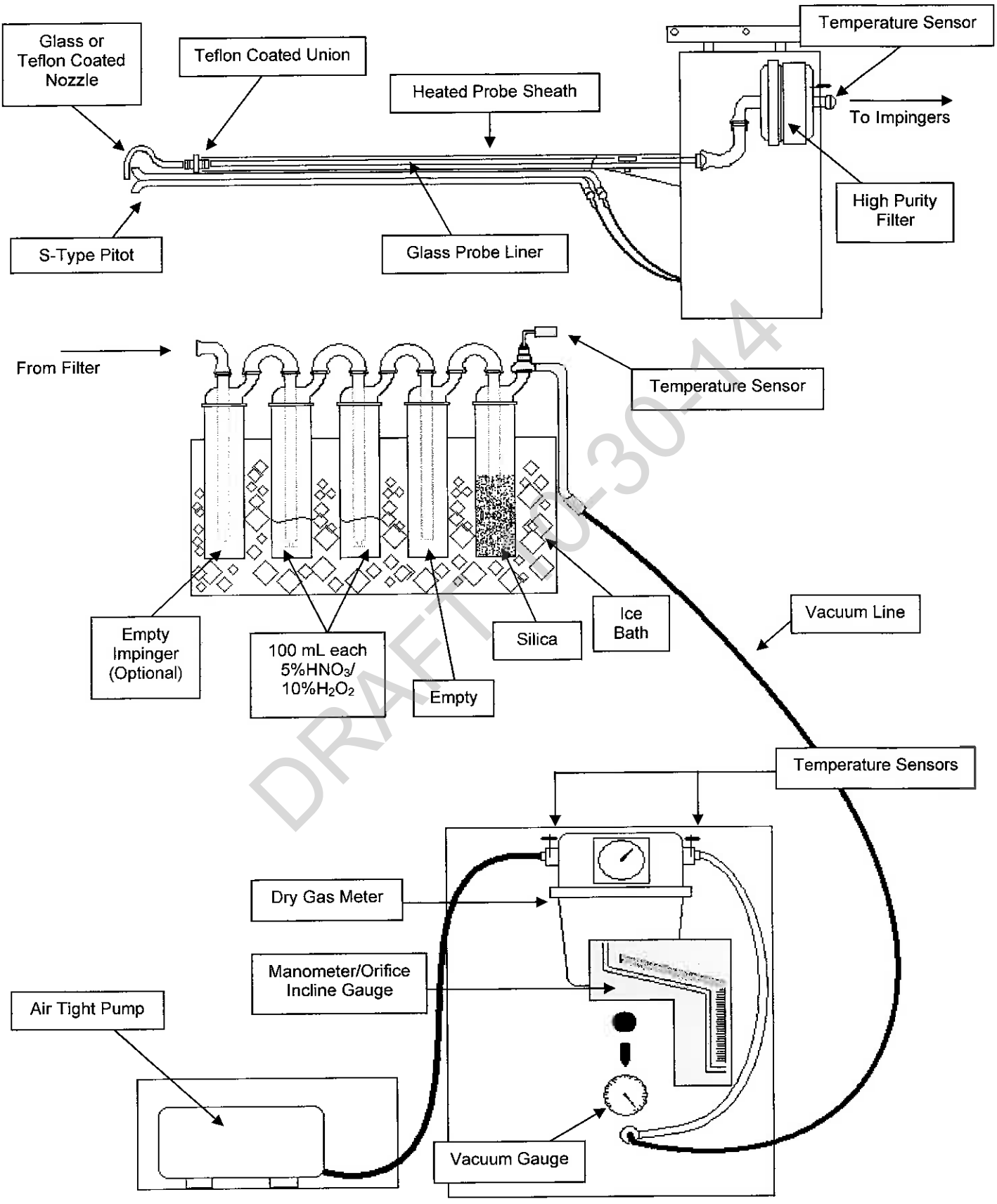
USEPA Method 2- Type S Pitot Tube Manometer Assembly



USEPA Method 3A - Integrated Oxygen/Carbon Dioxide Sample Train Diagram Utilizing Tedlar Gas Bag



USEPA Method 5/12- Particulate Matter/Lead Sample Train Diagram



Appendix D - Calculation Nomenclature and Formulas

Client:	Behr Iron & Metal
Facility:	Rockford Facility
Test Location:	TPU Baghouse Inlet
Run:	1
Date:	10/2/2014
Method:	5/12

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2 =$ 3.8 $\%O_2 =$ 15.4 $\%N_2 =$ 80.8

$Md =$ 29.224

Wet Molecular Weight

$$Ms = Md \times (1-Bws) + (18.0 \times Bws)$$

$Md =$ 29.224 $Bws =$ 0.281

$Ms =$ 26.073

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

$Y =$ 1.009 $Vm =$ 79.609 $Pbar =$ 29.00

$DH =$ 1.37 $Tm =$ 538.1

$Vm(std) =$ 76.665

Volume of Water Vapor Condensed

$Vw(std) =$ 0.0471 x (net H_2O gain)

Net $H_2O =$ 635.3

$Vw(std) =$ 29.923

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

$Vw(std) =$ 29.923 $Vm(std) =$ 76.665

$Bws =$ 0.281

Client:	Behr Iron & Metal
Facility:	Rockford Facility
Test Location:	TPU Baghouse Inlet
Run:	1
Date:	10/2/2014
Method:	5/12

Average Duct Velocity

$$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts\ (avg)/(Ps \times Ms))^{1/2}$$

Cp = 0.840 Ts (avg) = 858.9 Sqrt DP (avg): 0.347
Ps = 28.96 Ms = 26.073

Vs = 26.586

Volumetric Flow Rate (Actual Basis)

$$Q = Vs \times A \times 60$$

Vs = 26.586 A = 2.405

Q = 3,837

Volumetric Flow Rate (Standard Basis)

$$Qstd = 17.647 \times Q \times \frac{Ps}{Ts\ (avg)}$$

Q = 3,837 Ps = 28.96 Ts (avg) = 858.9

Qstd = 2,283

Volumetric Flow Rate (Standard Dry Basis)

$$Qstd(dry) = Qstd \times (1-Bws)$$

Qstd = 2,283 Bws = 0.281

Qstd(dry) = 1,642

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 858.9 Vm(std) = 76.665 Vs = 26.586
An = 0.0008639 θ = 120 Ps = 28.96
Bws = 0.281

%ISO = 108.4

Client:	Behr Iron & Metal
Facility:	Rockford Facility
Test Location:	TPU Baghouse Inlet
Run:	1
Date:	10/2/2014
Method:	5/12

PM Concentration:
This example represents the filterable fraction. For other fractions, use the obtained mn for that particulate fraction.

$$Co = \frac{m_n \times 15.43}{Vm(std)}$$

m_n (g) = 0.2607 Vm(std) = 76.665

Co = 0.0525 gr/dscf

PM Emission Rate:

$$\text{Emission Rate lb/hr} = \frac{Co}{7000} \times Qstd(dry) \times 60$$

Co = 0.0525 Qstd(dry) = 1,642

Emission Rate lb/hr = 0.7380 lb/hr

Client:	Behr Iron & Metal
Facility:	Rockford Facility
Test Location:	TPU Baghouse Inlet
Run:	1
Date:	10/2/2014
Method:	5/12

Lead (Pb) Concentration:

$$\mu g/m^3 = \frac{\mu g \text{ of Lead (Pb)}}{Vm(std) \times 0.02832\ m^3/ft^3}$$

µg= 20548.10 Vm(std) = 76.665

µg/m^3= 9465.18

Lead (Pb) Emission Rate:

$$\text{lb of Lead (Pb)} = \frac{\mu g \text{ of sample} \times 10^{-6}\ grams/\mu g}{453.6\ grams/lb}$$

lb of Lead (Pb) = 4.53E-05 dscfm = 1,642

$$\text{Emission Rate lb/hr} = \frac{\text{lb of Lead (Pb)}}{Vm(std)} \times \text{dscfm} \times 60\ min/hr$$

Emission Rate lb/hr = 0.058

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Isokinetic Nomenclature

A = Cross-sectional area of stack or duct, square feet
A_n = Cross-sectional area of nozzle, square feet
B_{ws} = Water vapor in gas stream, by volume
C_a = Acetone blank residue concentration, g/g
C_{acf} = Concentration of particulate matter in gas stream at actual conditions, gr/acf
C_p = Pitot tube coefficient
C_s = Concentration of particulate matter in gas stream, dry basis, corrected to standard conditions, gr/dscf
IKV = Isokinetic sampling variance, must be 90.0 % ≤ IKV ≤ 110.0%
M_d = Dry molecular weight of gas, lb/lb-mole
M_s = Molecular weight of gas, wet basis, lb/lb-mole
M_w = Molecular weight of water, 18.0 lb/lb-mole
m_a = Mass of residue of acetone after evaporation, grams
P_{bar} = Barometric pressure at testing site, inches mercury
P_g = Static pressure of gas, inches mercury (inches water/13.6)
P_s = Absolute pressure of gas, inches mercury = $P_{bar} + P_g$
P_{std} = Standard absolute pressure, 29.92 inches mercury
Q_{acfm} = Actual volumetric gas flow rate, acfm
Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, dscfh
R = Ideal gas constant, 21.85 inches mercury cubic foot/°R-lb-mole
T_m = Dry gas meter temperature, °R
T_s = Gas temperature, °R
T_{std} = Absolute temperature, 528°R
V_a = Volume of acetone blank, ml
V_{aw} = Volume of acetone used in wash, ml
W_a = Weight of residue in acetone wash, grams
m_n = Total amount of particulate matter collected, grams
V_{1c} = Total volume of liquid collected in impingers and silica gel, ml
V_m = Volume of gas sample as measured by dry gas meter, dcf
$V_{m(std)}$ = Volume of gas sample measured by dry gas meter, corrected to standard conditions, dscf
v_s = Gas velocity, ft/sec
$V_{w(std)}$ = Volume of water vapor in gas sample, corrected to standard conditions, scf
Y = Dry gas meter calibration factor
ΔH = Average pressure differential across the orifice meter, inches water
Δp = Velocity head of gas, inches water
ρ_a = Density of acetone, 0.7855 g/ml (average)
ρ_w = Density of water, 0.002201 lb/ml
θ = Total sampling time, minutes
K_1 = 17.647 °R/in. Hg
K_2 = 0.04707 ft^3/ml
K_4 = 0.09450/100 = 0.000945
K_p = Pitot tube constant, $85.49 \frac{ft}{sec}\left[\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(°R)(in.\ H_2O)}\right]^{1/2}$
%EA = Percent excess air
$\%CO_2$ = Percent carbon dioxide by volume, dry basis
$\%O_2$ = Percent oxygen by volume, dry basis
%CO = Percent carbon monoxide by volume, dry basis
$\%N_2$ = Percent nitrogen by volume, dry basis
0.264 = Ratio of O_2 to N_2 in air, v/v
28 = Molecular weight of N_2 or CO
32 = Molecular weight of O_2
44 = Molecular weight of CO_2
13.6 = Specific gravity of mercury (Hg)

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Isokinetic Calculation Formulas

1. $V_{w(std)} = V_{lc}\left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right) = K_2 V_{lc}$

2. $V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m}\right)\left(\frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{P_{std}}\right) = K_1 V_m Y \frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{T_m}$

3. $B_{ws} = \frac{V_{w(std)}}{(V_{m(std)} + V_{w(std)})}$

4. $M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2)$

5. $M_s = M_d(1 - B_{ws}) + 18.0(B_{ws})$

6. $C_a = \frac{m_a}{V_a \rho_a}$

7. $W_a = C_a V_{aw} \rho_a$

8. $C_{acf} = 15.43 K_i \left(\frac{m_n P_s}{V_{w(std)} + V_{m(std)} T_s}\right)$

9. $C_S = (15.43\ \text{grains/gram})(m_n / V_{m(std)})$

10. $v_s = K_p C_p \sqrt{\frac{\Delta P T_s}{P_s M_s}}$

11. $Q_{acfm} = v_s A(60_{\text{sec/min}})$

12. $Q_{sd} = (3600_{\text{sec/hr}})(1 - B_{ws})\, v_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right) A$

13. $E\ (\text{emission rate, lbs/hr}) = Q_{std}(C_s / 7000\ \text{grains/lb})$

14. $IKV = \frac{T_s V_{m(std)} P_{std}}{T_{std} v_s \theta A_n P_s 60(1 - B_{ws})} = K_4 \frac{T_s V_{m(std)}}{P_s v_s A_n \theta (1 - B_{ws})}$

15. $\%EA = \left(\frac{\%O_2 - (0.5\,\%CO)}{0.264\,\%N_2 - (\%O_2 - 0.5\,\%CO)}\right) \times 100$

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Volumetric Flow Nomenclature

A = Cross-sectional area of stack or duct, ft2
Bws = Water vapor in gas stream, proportion by volume
Cp = Pitot tube coefficient, dimensionless
Md = Dry molecular weight of gas, lb/lb-mole
Ms = Molecular weight of gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pbar = Barometric pressure at testing site, in. Hg
Pg = Static pressure of gas, in. Hg (in. H2O/13.6)
DH= Static pressure of gas, in.H2O
Ps = Absolute pressure of gas, in. Hg = Pbar + Pg
Pstd = Standard absolute pressure, 29.92 in. Hg
Acfm = Actual volumetric gas flow rate
Scfm= Volumetric gas flow rate, corrected to standard conditions
Dscfm = Standard volumetric flow rate, corrected to dry conditions
R = Ideal gas constant, 21.85 in. Hg-ft3/°R-lb-mole
Ts = Average stack gas temperature, °F
Tm = Average dry gas meter temperature, oF
Tstd = Standard absolute temperature, 528°R
vs = Gas velocity, ft/sec
Vm(std)= Volume of gas sampled, corrected to standard conditions, scf
Vw(std) = Volume of water vapor in gas sample, corrected to standard conditions, scf
Vlc= Volume of liquid collected
Y = Dry gas meter calibration factor
Δp = Velocity head of gas, in. H2O
K1 = 17.647 °R/in. Hg
%EA = Percent excess air
%CO2 = Percent carbon dioxide by volume, dry basis
%O2 = Percent oxygen by volume, dry basis
%N2 = Percent nitrogen by volume, dry basis
0.264 = Ratio of O2 to N2 in air, v/v
0.28 = Molecular weight of N2 or CO, divided by 100
0.32 = Molecular weight of O2 divided by 100
0.44 = Molecular weight of CO2 divided by 100
13.6 = Specific gravity of mercury (Hg)

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Volumetric Air Flow Calculations

$$Vm\ (std) = 17.647 \times Vm \times \left[\frac{\left(P_{bar} + \left[\frac{DH}{13.6}\right]\right)}{(460 + Tm)}\right] \times Y$$

$$Vw\ (std) = 0.0471 \times Vlc$$

$$Bws = \left[\frac{Vw\ (std)}{Vw\ (std) + Vm\ (std)}\right]$$

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + [0.28 \times (100 - \%CO_2 - \%O_2)]$$

$$Ms = Md \times (1 - Bws) + (18 \times Bws)$$

$$Vs = \sqrt{\frac{(Ts + 460)}{Ms \times Ps}} \times \sqrt{DP} \times Cp \times 85.49$$

$$Acfm = Vs \times Area\ (of\ stack\ or\ duct) \times 60$$

$$Scfm = Acfm \times 17.647 \times \left[\frac{Ps}{(460 + Ts)}\right]$$

$$Scfh = Scfm \times 60\frac{min}{hr}$$

$$Dscfm = Scfm \times (1 - Bws)$$

Appendix E - Laboratory Sample Analysis

Client:	**Behr Iron & Metal**		
Facility:	**Rockford Facility**		
Project Number:	**M143903**		
Test Location:	**TPU Baghouse Inlet**		
Test Method:	**5/12**	**Filter Drying Temp°F:**	**Des. 24 Hours**
Filterable Analysis Date:	**10/8/2014**	**Analyst:**	**JMG**

Description	Date	ID#	vol. (ml)	Initial Weight (grams)	Final Weight (grams)	Net Weight Gain (grams)
Filterable Particulate						
Test No. 1	10/2/2014					
M5 Filter		7475		0.4727	0.7006	0.2279
Acetone Wash (Teflon		534	55 ml	1.3351	1.3680	0.0329
Acetone Blank						0.0001
Total Front Half Weight						**0.2607**
Filterable Particulate						
Test No. 2	10/2/2014					
M5 Filter		7479		0.4751	0.6629	0.1878
Acetone Wash (Teflon		536	30 ml	1.3461	1.3871	0.0410
Acetone Blank						0.0001
Total Front Half Weight						**0.2287**
Filterable Particulate						
Test No. 3	10/2/2014					
M5 Filter		7473		0.4736	0.7454	0.2718
Acetone Wash (Teflon		537	50 ml	1.3407	1.3694	0.0287
Acetone Blank						0.0001
Total Front Half Weight						**0.3004**
Reagent Blank Summary						
Acetone Wash (Teflon		490	100 ml	1.3329	1.3331	0.0002

Client: Behr Iron & Metal
Facility: Rockford Facility
Project Number: M143903
Test Location: TPU Baghouse Outlet
Test Method: 5/12
Filterable Analysis Date: 10/8/2014

Filter Drying Temp °F: Des. 24 Hours
Analyst: JMG

Description	Date	ID#	vol. (ml)	Initial Weight (grams)	Final Weight (grams)	Net Weight Gain (grams)
Filterable Particulate						
Test No. 1	10/2/2014					
M5 Filter		7474		0.4743	0.4835	0.0092
Acetone Wash (Teflon Baggies)		538	60 ml	1.3396	1.3453	0.0057
Acetone Blank						0.0001
Total Front Half Weight						**0.0148**
Filterable Particulate						
Test No. 2	10/2/2014					
M5 Filter		7478		0.4714	0.4741	0.0027
Acetone Wash (Teflon Baggies)		539	40 ml	1.3705	1.3734	0.0029
Acetone Blank						0.0001
Total Front Half Weight						**0.0055**
Filterable Particulate						
Test No. 3	10/2/2014					
M5 Filter		7480		0.4719	0.4880	0.0161
Acetone Wash (Teflon Baggies)		540	84 ml	1.3672	1.3705	0.0033
Acetone Blank						0.0002
Total Front Half Weight						**0.0192**
Reagent Blank Summary						
Acetone Wash (Teflon Baggies)		490	100 ml	1.3329	1.3331	0.0002

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Chain-of-Custody Form	
Project Number:M143903	Date Results Required:
Client: Joseph Behr & Sons, Inc.	TAT Required:
Plant/Test Location: Rockford Facility/Rotary Furnace System	Project Supervisor: STS

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
001	9/30/14	Baghouse Outlet Stack-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
002	9/30/14	Baghouse Outlet Stack-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
003	9/30/14	Baghouse Outlet Stack-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
004	9/30/14	Feed Hopper Bypass-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
005	9/30/14	Feed Hopper Bypass-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
006	9/30/14	Feed Hopper Bypass-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
007	9/30/14	Furnace Outlet-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
008	9/30/14	Furnace Outlet-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
009	9/30/14	Furnace Outlet-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
010	9/30/14	Baghouse Inlet-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
011	9/30/14	Baghouse Inlet-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
012	9/30/14	Baghouse Inlet-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
013	9/30/14	Acetone Reagent Blank	1	In-house	M5/12***	----------
014	9/30/14	Baghouse Outlet Stack-Test 1- Impinger catch and 0.1NHNO_3 PW	2	MAX	M12	59,271
015	9/30/14	Baghouse Outlet Stack-Test 2- Impinger catch and 0.1NHNO_3 PW	2	MAX	M12	79,282

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016	9/30/14	Baghouse Outlet Stack-Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	75,293
017	9/30/14	Feed Hopper Bypass-Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	71,328
018	9/30/14	Feed Hopper Bypass-Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	27,311
019	9/30/14	Feed Hopper Bypass-Test 3 Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	22,329
020	9/30/14	Furnace Outlet-Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	43,334
021	9/30/14	Furnace Outlet-Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	49,315
022	9/30/14	Furnace Outlet-Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	29,371
023	9/30/14	Baghouse Inlet-Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	31,273
024	9/30/14	Baghouse Inlet-Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	39,268
025	9/30/14	Baghouse Inlet-Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	51,289
026	9/30/14	0.1NHNO$_3$ Reagent Blank	1	MAX	M12	225
027	10/1/14	Baghouse Outlet Stack-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
028	10/1/14	Baghouse Outlet Stack-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
029	10/1/14	Baghouse Outlet Stack-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
030	10/1/14	Pot 3 Inlet Duct-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
031	10/1/14	Pot 3 Inlet Duct -Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
032	10/1/14	Pot 3 Inlet Duct -Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
033	10/1/14	Pot 2 Inlet Duct -Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
034	10/1/14	Pot 2 Inlet Duct -Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------

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035	10/1/14	Pot 2 Inlet Duct -Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
036	10/1/14	Baghouse Outlet Stack-Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	26,287
037	10/1/14	Baghouse Outlet Stack-Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	30,284
038	10/1/14	Baghouse Outlet Stack-Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	31,297
039	10/1/14	Pot 3 Inlet Duct -Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	29,287
040	10/1/14	Pot 3 Inlet Duct -Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	39,289
041	10/1/14	Pot 3 Inlet Duct -Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	36,284
042	10/1/14	Pot 2 Inlet Duct -Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	54,285
043	10/1/14	Pot 2 Inlet Duct -Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	34,286
044	10/1/14	Pot 2 Inlet Duct -Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	33,288
045	10/2/14	TPU Outlet Stack-Test 1- Filter and Acetone PW	2	In-house	M5	----------
046	10/2/14	TPU Outlet Stack -Test 2- Filter and Acetone PW	2	In-house	M5	----------
047	10/2/14	TPU Outlet Stack -Test 3- Filter and Acetone PW	2	In-house	M5	----------
048	10/2/14	TPU Inlet Duct -Test 1- Filter and Acetone PW	2	In-house	M5	----------
049	10/2/14	TPU Inlet Duct -Test 2- Filter and Acetone PW	2	In-house	M5	----------
050	10/2/14	TPU Inlet Duct -Test 3- Filter and Acetone PW	2	In-house	M5	----------
051	10/2/14	TPU Outlet Stack -Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	35,659
052	10/2/14	TPU Outlet Stack -Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	39,817
053	10/2/14	TPU Outlet Stack -Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	33,864

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054	10/2/14	TPU Inlet Duct -Test 1- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	21,913
055	10/2/14	TPU Inlet Duct -Test 2- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	19,735
056	10/2/14	TPU Inlet Duct -Test 3- Impinger catch and 0.1NHNO$_3$ PW	2	MAX	M12	26,972

Delivered to Lab by:	Date/Time:	Received by:	Date/Time:	Processed by:	Date/Time:
		[signature]	10/6/14	[signature]	10/8/14

Laboratory Notes: ***M5 analysis is being performed at Mostardi Platt. I will send the samples for M12 analysis when M5 is finished.

Maxxam

Your P.O. #: MP2755
Your Project #: M142203
Site Location: JOSEPH BEHR & SONS

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 013, 026, 001/014, 002/015, 003/016, 004/017, 005/018, 006/019, 007/020, 008/021, 009/022, 010/023, 011/024, 012/025, 027/036, 028/037, 029/038, 030/039, 031/040, 032/041, 033/042, 034/043, 035/044, 045/051, 046/052, 047/053, 048/054, 049/055, 050/056, 057

Report Date: 2014/10/23
Report #: R3198147
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4J0182
Received: 2014/10/09, 14:30

Sample Matrix: Stack Sampling Train
Samples Received: 31

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Lead in Filter by ICPMS (M12mod) (1)	31	2014/10/18	2014/10/20	BRL SOP-00103	EPA 12 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) EPA Method 12 Modification - The analysis for the lead was completed using ICPMS instead of flame AA.

Encryption Key

Clayton Johnson
23 Oct 2014 18:24:12 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Maxxam ID		XZ2744	XZ2745		XZ2746			
Sampling Date		2014/09/30	2014/09/30		2014/09/30			
COC Number		013	026		001/014			
	Units	M5/12-RB-ACETONE	M5/12-RB-HNO3	RDL	M5/12-BH OUT-09/30-T1	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	51.2	0.7	0.2	367	0.5	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2746	XZ2747	XZ2748			
Sampling Date		2014/09/30	2014/09/30	2014/09/30			
COC Number		001/014	002/015	003/016			
	Units	M5/12-BH OUT-09/30-T1 Lab-Dup	M5/12-BH OUT-09/30-T2	M5/12-BH OUT-09/30-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	370	287	1500	0.5	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		XZ2749	XZ2750		XZ2751			
Sampling Date		2014/09/30	2014/09/30		2014/09/30			
COC Number		004/017	005/018		006/019			
	Units	M5/12-FEED H B-09/30-T1	M5/12-FEED H B-09/30-T2	RDL	M5/12-FEED H B-09/30-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	3400	3050	0.5	8530	3	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2752	XZ2753	XZ2754			
Sampling Date		2014/09/30	2014/09/30	2014/09/30			
COC Number		007/020	008/021	009/022			
	Units	M5/12-FUR OUT-09/30-T1	M5/12-FUR OUT-09/30-T2	M5/12-FUR OUT-09/30-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	981000	1760000	1540000	300	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Maxxam ID		XZ2755		XZ2756	XZ2757			
Sampling Date		2014/09/30		2014/09/30	2014/09/30			
COC Number		010/023		011/024	012/025			
	Units	M5/12-BH IN-09/30-T1	RDL	M5/12-BH IN-09/30-T2	M5/12-BH IN-09/30-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	176000	50	525000	481000	300	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2758	XZ2759	XZ2760			
Sampling Date		2014/10/01	2014/10/01	2014/10/01			
COC Number		027/036	028/037	029/038			
	Units	M5/12-BH OUT-10/01-T1	M5/12-BH OUT-10/01-T2	M5/12-BH OUT-10/01-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	1260	1040	707	0.5	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2761		XZ2762	XZ2763			
Sampling Date		2014/10/01		2014/10/01	2014/10/01			
COC Number		030/039		031/040	032/041			
	Units	M5/12-POT 3 IN-10/01-T1	RDL	M5/12-POT 3 IN-10/01-T2	M5/12-POT 3 IN-10/01-T3	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	2590	0.5	5660	5900	1	3790307	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2764	XZ2764		XZ2765			
Sampling Date		2014/10/01	2014/10/01		2014/10/01			
COC Number		033/042	033/042		034/043			
	Units	M5/12-POT 2 IN-10/01-T1	M5/12-POT 2 IN-10/01-T1 Lab-Dup	RDL	M5/12-POT 2 IN-10/01-T2	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	2830	2830	1	1000	0.5	3790310	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Maxxam ID		XZ2766		XZ2767			
Sampling Date		2014/10/01		2014/10/02			
COC Number		035/044		045/051			
	Units	M5/12-POT 2 IN-10/01-T3	RDL	M5/12-TPU OUT-10/02-T1	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	691	0.5	1450	1	3790310	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2768	XZ2769		XZ2770			
Sampling Date		2014/10/02	2014/10/02		2014/10/02			
COC Number		046/052	047/053		048/054			
	Units	M5/12-TPU OUT-10/02-T2	M5/12-TPU OUT-10/02-T3	RDL	M5/12-TPU IN-10/02-T1	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	1990	2130	0.5	20600	5	3790310	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2771		XZ2772		XZ2780			
Sampling Date		2014/10/02		2014/10/02					
COC Number		049/055		050/056		057			
	Units	M5/12-TPU IN-10/02-T2	RDL	M5/12-TPU IN-10/02-T3	RDL	AUDIT-041614I-1429	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	19900	5	26800	10	81.7	0.5	3790310	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		XZ2782			
Sampling Date					
COC Number		057			
	Units	AUDIT-041614I-1430	RDL	QC Batch	MDL
Inorganic Lead (Pb)	ug	21.0	0.005	3790310	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

TEST SUMMARY

Maxxam ID: XZ2744
Sample ID: M5/12-RB-ACETONE
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2745
Sample ID: M5/12-RB-HNO3
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2746
Sample ID: M5/12-BH OUT-09/30-T1
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2746 Dup
Sample ID: M5/12-BH OUT-09/30-T1
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2747
Sample ID: M5/12-BH OUT-09/30-T2
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2748
Sample ID: M5/12-BH OUT-09/30-T3
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2749
Sample ID: M5/12-FEED H B-09/30-T1
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

TEST SUMMARY

Maxxam ID: XZ2750
Sample ID: M5/12-FEED H B-09/30-T2
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2751
Sample ID: M5/12-FEED H B-09/30-T3
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2752
Sample ID: M5/12-FUR OUT-09/30-T1
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2753
Sample ID: M5/12-FUR OUT-09/30-T2
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2754
Sample ID: M5/12-FUR OUT-09/30-T3
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2755
Sample ID: M5/12-BH IN-09/30-T1
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2756
Sample ID: M5/12-BH IN-09/30-T2
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

TEST SUMMARY

Maxxam ID: XZ2757
Sample ID: M5/12-BH IN-09/30-T3
Matrix: Stack Sampling Train

Collected: 2014/09/30
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2758
Sample ID: M5/12-BH OUT-10/01-T1
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2759
Sample ID: M5/12-BH OUT-10/01-T2
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2760
Sample ID: M5/12-BH OUT-10/01-T3
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2761
Sample ID: M5/12-POT 3 IN-10/01-T1
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2762
Sample ID: M5/12-POT 3 IN-10/01-T2
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2763
Sample ID: M5/12-POT 3 IN-10/01-T3
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790307	2014/10/18	2014/10/20	Nan Raykha

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

TEST SUMMARY

Maxxam ID: XZ2764
Sample ID: M5/12-POT 2 IN-10/01-T1
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2764 Dup
Sample ID: M5/12-POT 2 IN-10/01-T1
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2765
Sample ID: M5/12-POT 2 IN-10/01-T2
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2766
Sample ID: M5/12-POT 2 IN-10/01-T3
Matrix: Stack Sampling Train

Collected: 2014/10/01
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2767
Sample ID: M5/12-TPU OUT-10/02-T1
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2768
Sample ID: M5/12-TPU OUT-10/02-T2
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2769
Sample ID: M5/12-TPU OUT-10/02-T3
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

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Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

TEST SUMMARY

Maxxam ID: XZ2770
Sample ID: M5/12-TPU IN-10/02-T1
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2771
Sample ID: M5/12-TPU IN-10/02-T2
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2772
Sample ID: M5/12-TPU IN-10/02-T3
Matrix: Stack Sampling Train

Collected: 2014/10/02
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2780
Sample ID: AUDIT-041614I-1429
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

Maxxam ID: XZ2782
Sample ID: AUDIT-041614I-1430
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2014/10/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	3790310	2014/10/18	2014/10/20	Nan Raykha

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Report Date: 2014/10/23

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Your P.O. #: MP2755

GENERAL COMMENTS

Sample XZ2744-01 : Reanalyzed the digest on 2014-10-21 to confirm data (Pb = 51.6 ug)

Sample XZ2782-01 : Data for this sample is reported in ug/ml

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Lead in Filter by ICPMS (M12mod): Extra 2x, 5x 10x or 500x dilution was required for some samples due to the high levels.
Post digestion duplicate and spike was done on sample XZ2746.
Lead in Filter by ICPMS (M12mod): Extra 2x, 5x 10x or 20x dilution was required for some samples due to the high levels.
Post digestion duplicate and spike was done on sample XZ2764.

Results relate only to the items tested.

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

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Your P.O. #: MP2755

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
3790307	N_R	Matrix Spike(XZ2746)	Inorganic Lead (Pb)	2014/10/20		90	%	70 - 130
3790307	N_R	Matrix Spike DUP(XZ2746)	Inorganic Lead (Pb)	2014/10/20		87	%	70 - 130
3790307	N_R	MS/MSD RPD	Inorganic Lead (Pb)	2014/10/20	3.4		%	20
3790307	N_R	Spiked Blank	Inorganic Lead (Pb)	2014/10/20		100	%	85 - 115
3790307	N_R	Spiked Blank DUP	Inorganic Lead (Pb)	2014/10/20		102	%	85 - 115
3790307	N_R	RPD	Inorganic Lead (Pb)	2014/10/20	2.5		%	20
3790307	N_R	Method Blank	Inorganic Lead (Pb)	2014/10/20	<0.5		ug	
3790307	N_R	RPD - Sample/Sample Dup	Inorganic Lead (Pb)	2014/10/20	0.65		%	20
3790310	N_R	Matrix Spike(XZ2764)	Inorganic Lead (Pb)	2014/10/20		90	%	70 - 130
3790310	N_R	Matrix Spike DUP(XZ2764)	Inorganic Lead (Pb)	2014/10/20		85	%	70 - 130
3790310	N_R	MS/MSD RPD	Inorganic Lead (Pb)	2014/10/20	5.7		%	20
3790310	N_R	Spiked Blank	Inorganic Lead (Pb)	2014/10/20		100	%	85 - 115
3790310	N_R	Spiked Blank DUP	Inorganic Lead (Pb)	2014/10/20		99	%	85 - 115
3790310	N_R	RPD	Inorganic Lead (Pb)	2014/10/20	0.054		%	20
3790310	N_R	Method Blank	Inorganic Lead (Pb)	2014/10/20	0.7 , RDL=0.5		ug	
3790310	N_R	RPD - Sample/Sample Dup	Inorganic Lead (Pb)	2014/10/20	0.14		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam Job #: B4J0182
Report Date: 2014/10/23

Mostardi Platt
Client Project #: M142203
Site Location: JOSEPH BEHR & SONS
Your P.O. #: MP2755

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ralph Siebert, Operations Manager - Inorganic Analyses

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain-of-Custody Form

Project Number: M143003	Data Results Required:
Client: Joseph Ely & Sons, Inc.	TAT Required:
Plant/Test Location: Rockford Foundry/Rotary Furnace System	Project Supervisor: STS

Sample Number	Sample Date	Sample Point Identification	# of Cans	Sub Lab	Analyses Required	Volume mls
001	9/30/14	Baghouse Outlet Stack-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
002	9/30/14	Baghouse Outlet Stack-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
003	9/30/14	Baghouse Outlet Stack-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
004	9/30/14	Feed Hopper Bypass-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
005	9/30/14	Feed Hopper Bypass-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
006	9/30/14	Feed Hopper Bypass-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
007	9/30/14	Furnace Outlet-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
008	9/30/14	Furnace Outlet-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
009	9/30/14	Furnace Outlet-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
010	9/30/14	Baghouse Inlet-Test 1- Filter and Acetone PW	2	In-house	M5/12***	----------
011	9/30/14	Baghouse Inlet-Test 2- Filter and Acetone PW	2	In-house	M5/12***	----------
012	9/30/14	Baghouse Inlet-Test 3- Filter and Acetone PW	2	In-house	M5/12***	----------
013	9/30/14	Acetone Reagent Blank	1	In-house	M5/12***	----------
014	9/30/14	Baghouse Outlet Stack-Test 1- Impinger catch and 0.1N HNO_3 PW	2	MAX	M12	56.371
015	9/30/14	Baghouse Outlet Stack-Test 2- Impinger catch and 0.1N HNO_3 PW	2	MAX	M12	76.262

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016	9/30/14	Baghouse Outlet Stack-Test 3- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	75,285
017	9/30/14	Feed Hopper Bypass-Test 1- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	71,205
018	9/30/14	Feed Hopper Bypass-Test 2- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	27,311
019	9/30/14	Feed Hopper Bypass-Test 3 Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	32,209
020	9/30/14	Furnace Outlet-Test 1- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	43,934
021	9/30/14	Furnace Outlet-Test 2- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	49,316
022	9/30/14	Furnace Outlet-Test 3- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	39,371
023	9/30/14	Baghouse Inlet-Test 1- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	31,979
024	9/30/14	Baghouse Inlet-Test 2- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	38,268
025	9/30/14	Baghouse Inlet-Test 3- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	41,389
026	9/30/14	0.1N HNO_3 Reagent Blank	1	MAX	M12	229
027	10/1/14	Baghouse Outlet Stack-Test 1- Filter and Acetone RW	2	In-House	M5/12***	----------
028	10/1/14	Baghouse Outlet Stack-Test 2- Filter and Acetone RW	2	In-House	M5/12***	----------
029	10/1/14	Baghouse Outlet Stack-Test 3- Filter and Acetone RW	2	In-House	M5/12***	----------
030	10/1/14	Pot 3 Inlet Duct-Test 1- Filter and Acetone RW	2	In-House	M5/12***	----------
031	10/1/14	Pot 3 Inlet Duct -Test 2- Filter and Acetone RW	2	In-House	M5/12***	----------
032	10/1/14	Pot 3 Inlet Duct -Test 3- Filter and Acetone RW	2	In-House	M5/12***	----------
033	10/1/14	Pot 2 Inlet Duct -Test 1- Filter and Acetone RW	2	In-House	M5/12***	----------
034	10/1/14	Pot 3 Inlet Duct -Test 2- Filter and Acetone RW	2	In-House	M5/12***	----------

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035	10/1/14	Pot 2 Inlet Duct - Test 3- Filter and Acetone PW	2	In-house	M5/13***	----------
036	10/1/14	Baghouse Outlet Stack-Test 1- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	28,287
037	10/1/14	Baghouse Outlet Stack-Test 2- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	30,284
038	10/1/14	Baghouse Outlet Stack-Test 3- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	31,287
039	10/1/14	Pot 3 Inlet Duct -Test 1- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	28,287
040	10/1/14	Pot 3 Inlet Duct -Test 2- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	30,286
041	10/1/14	Pot 3 Inlet Duct -Test 3- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	30,284
042	10/1/14	Pot 2 Inlet Duct -Test 1- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	34,285
043	10/1/14	Pot 2 Inlet Duct -Test 2- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	34,286
044	10/1/14	Pot 2 Inlet Duct -Test 3- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	33,286
045	10/2/14	TPU Outlet Stack-Test 1- Filter and Acetone PW	2	In-house	M5/13***	----------
046	10/2/14	TPU Outlet Stack -Test 2- Filter and Acetone PW	2	In-house	M5/13***	----------
047	10/2/14	TPU Outlet Stack -Test 3- Filter and Acetone PW	2	In-house	M5/13***	----------
048	10/2/14	TPU Inlet Duct -Test 1- Filter and Acetone PW	2	In-house	M5/13***	----------
049	10/2/14	TPU Inlet Duct -Test 2- Filter and Acetone PW	2	In-house	M5/13***	----------
050	10/2/14	TPU Inlet Duct -Test 3- Filter and Acetone PW	2	In-house	M5/13***	----------
051	10/2/14	TPU Outlet Stack -Test 1- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	33,559
052	10/2/14	TPU Outlet Stack -Test 2- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	33,917
053	10/2/14	TPU Outlet Stack -Test 3- Impinger catch and 0.1N HNO3 PW	2	MAX	M13	33,894

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054	10/2/14	TPU Inlet Duct -Test 1- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	21,815
055	10/2/14	TPU Inlet Duct -Test 2- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	19,739
056	10/2/14	TPU Inlet Duct -Test 3- Impinger catch and 0.1N HNO_3 RW	2	MAX	M12	26,972
057		Audit Sample				

Delivered to Lab by	Date/Time	Received by	Date/Time	Processed by	Date/Time
	10/14		2014/10/31 11:30		

Laboratory Notes: ***M5 analysis is being performed at Mostardi Platt. I will send the samples for M12 analysis when M5 is finished

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Inlet
Test Method: 5/12

		Run 1	Run 2	Run 3
Identify Analyte:	Lead (Pb)			
Molecular Weight:	207.19	ADL	ADL	ADL
ug (net) collected:		20548.1	19848.1	26748.1

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Outlet
Test Method: 5/12

		Run 1	Run 2	Run 3
Identify Analyte:	Lead (Pb)			
Molecular Weight:	207.19	ADL	ADL	ADL
ug (net) collected:		1398.1	1938.1	2078.1

Appendix F - Reference Method Test Data (Computerized Sheets)

Client:		Behr Iron & Metal		
Facility:		Rockford Facility		
Test Location:		TPU Baghouse Inlet		
Project #:		M143903		
Test Method:		5/12		
Test Engineer:		JHOWE		
Test Technician:		BPT		
	R1	**R2**	**R3**	
Temp ID:	CM30	CM30	CM30	
Meter ID:	CM30	CM30	CM30	
Pitot ID:	123	123	123	
Nozzle Diameter:	0.398	0.398	0.398	**in.**
Meter Calibration Factor (Y):	1.009	1.009	1.009	
Meter Orifice Setting (Delta H):	1.737	1.737	1.737	
Pitot Tube Coefficient:		0.840		
Probe Length:		3.0		**ft**
Probe Liner Material:		Glass		
Nozzle Kit ID Number and Material:		Teflon 7		
Port Length:		6.00		**in.**
Port Size (diameter):		6.00		**in.**
Port Type:		Nipple		
Duct Shape:		Circular		
Diameter		1.75		**ft**
Duct Area:		2.405		**Sq. Ft.**
Upstream Diameters:		>.5		
Downstream Diameters:		>2		
Number of Ports Sampled:		2		
Number of Points per Port:		12		
Minutes per Point:		5.0		
Minutes per Reading:		5.0		
Total Number of Traverse Points:		24		
Test Length:		120		**min.**
Train Type:		Hot Box		
Source Condition:		Normal		
Servomex Serial Number:		01440D1/4385		
Moisture Balance ID:		S10-39		
# of Runs		3		

Run 1-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Inlet
Source Condition: Normal

Date: 10/2/14
Start Time: 9:20
End Time: 11:25

DRY GAS METER CONDITIONS

ΔH:	1.37	in. H_2O
Meter Temperature, Tm:	78.1	°F
Sqrt ΔP:	0.347	in. H_2O
Stack Temperature, Ts:	398.9	°F
Meter Volume, Vm:	79.609	ft^3
Meter Volume, Vmstd:	76.665	dscf
Meter Volume, Vwstd:	29.923	wscf
Isokinetic Variance:	108.4	%I
	0.00	
Test Length	120.00	in mins.
Nozzle Diameter	0.398	in inches
Barometric Pressure	29.00	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	28.96	in. Hg. abs.
Carbon Dioxide:	3.80	%
Oxygen:	15.40	%
Nitrogen:	80.80	%
Gas Weight dry, Md:	29.224	lb/lb mole
Gas Weight wet, Ms:	26.073	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	26.586	fps
Volumetric Flow:	3,837	acfm
Volumetric Flow:	1,642	dscfm
Volumetric Flow:	2,283	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2016.5	ml	Silica Initial Wt.	856.6	grams
Final Impinger Content:	2621.8	ml	Silica Final Wt.	886.6	grams
Difference:	605.3		Difference:	30.0	
Total Water Gain:	635.3		Moisture, Bws:	0.281	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	9:20:00	0.19	2.00	65.863	419	72	70	0.436	4.072	33.387
1-2	9:25:00	0.16	1.70	69.935	418	73	71	0.400	3.775	30.638
1-3	9:30:00	0.08	0.84	73.710	446	74	71	0.283	2.625	21.665
1-4	9:35:00	0.06	0.63	76.335	424	75	72	0.245	2.165	18.762
1-5	9:40:00	0.05	0.55	78.500	410	77	73	0.224	2.215	17.127
1-6	9:45:00	0.05	0.56	80.715	388	76	73	0.224	1.694	17.127
1-7	9:50:00	0.09	1.00	82.409	418	76	73	0.300	3.221	22.979
1-8	9:55:00	0.07	0.78	85.630	320	77	73	0.265	2.590	20.265
1-9	10:00:00	0.06	0.67	88.220	381	77	73	0.245	2.395	18.762
1-10	10:05:00	0.12	1.30	90.615	450	78	73	0.346	3.205	26.534
1-11	10:10:00	0.17	1.90	93.820	365	78	74	0.412	3.915	31.581
1-12	10:15:00	0.20	2.20	97.735	369	79	74	0.447	4.360	34.255
	10:20:00			102.095						
2-1	10:25:00	0.21	2.30	102.095	461	83	79	0.458	4.295	35.101
2-2	10:30:00	0.18	2.00	106.390	456	82	78	0.424	3.995	32.497
2-3	10:35:00	0.16	1.80	110.385	402	84	80	0.400	3.920	30.638
2-4	10:40:00	0.16	1.80	114.305	403	83	80	0.400	3.715	30.638
2-5	10:45:00	0.13	1.40	118.020	454	84	82	0.361	3.460	27.617
2-6	10:50:00	0.13	1.40	121.480	426	83	81	0.361	3.355	27.617
2-7	10:55:00	0.11	1.20	124.835	435	85	81	0.332	3.275	25.404
2-8	11:00:00	0.11	1.20	128.110	429	83	81	0.332	3.295	25.404
2-9	11:05:00	0.10	1.10	131.405	390	83	81	0.316	3.095	24.222
2-10	11:10:00	0.12	1.30	134.500	305	83	81	0.346	3.340	26.534
2-11	11:15:00	0.16	1.80	137.840	310	83	81	0.400	3.905	30.638
2-12	11:20:00	0.14	1.50	141.745	295	83	81	0.374	3.727	28.660
	11:25:00			145.472						
Total				79.609		79.6	76.5		79.609	
Average			1.37		398.9	78.1		0.347		
Min			0.55		295.0	70.0		0.224		
Max			2.30		461.0	85.0		0.458		

Run 2-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Inlet
Source Condition: Normal

Date: 10/2/14
Start Time: 11:55
End Time: 13:58

DRY GAS METER CONDITIONS

ΔH:	1.76	In. H_2O
Meter Temperature, Tm:	83.1	°F
Sqrt ΔP:	0.384	In. H_2O
Stack Temperature, Ts:	416.3	°F
Meter Volume, Vm:	89.009	ft^3
Meter Volume, Vmstd:	85.005	dscf
Meter Volume, Vwstd:	20.489	wscf
Isokinetic Variance:	99.8	%I
Test Length	120.00	in mins.
Nozzle Diameter	0.398	in inches
Barometric Pressure	29.00	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	28.96	in. Hg. abs.
Carbon Dioxide:	4.30	%
Oxygen:	14.70	%
Nitrogen:	81.0	%
Gas Weight dry, Md:	29.276	lb/lb mole
Gas Weight wet, Ms:	27.086	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	29.157	fps
Volumetric Flow:	4,208	acfm
Volumetric Flow:	1,977	dscfm
Volumetric Flow:	2,454	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2004.3	ml	Silica Initial Wt.	809.2	grams
Final Impinger Content:	2419.6	ml	Silica Final Wt.	828.9	grams
Difference:	415.3		Difference:	19.7	
Total Water Gain:	435.0		Moisture, Bws:	0.194	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	11:55:00	0.14	1.50	48.639	454	83	82	0.374	3.666	28.401
1-2	12:00:00	0.16	1.80	52.305	445	83	81	0.400	3.810	30.362
1-3	12:05:00	0.14	1.50	56.115	430	86	84	0.374	3.600	28.401
1-4	12:10:00	0.16	1.80	59.715	420	85	84	0.400	3.875	30.362
1-5	12:15:00	0.13	1.40	63.590	447	86	84	0.361	3.505	27.368
1-6	12:20:00	0.16	1.80	67.095	456	86	84	0.400	3.810	30.362
1-7	12:25:00	0.31	3.40	70.905	463	86	84	0.557	5.140	42.262
1-8	12:30:00	0.28	3.10	76.045	422	86	84	0.529	5.175	40.165
1-9	12:35:00	0.28	3.10	81.220	401	86	84	0.529	5.055	40.165
1-10	12:40:00	0.22	2.40	86.275	419	86	85	0.469	4.530	35.602
1-11	12:45:00	0.11	1.20	90.805	422	86	85	0.332	3.280	25.175
1-12	12:50:00	0.04	0.44	94.085	335	87	85	0.200	2.188	15.181
	12:55:00			96.273						
2-1	12:58:00	0.04	0.44	96.273	356	80	80	0.200	1.902	15.181
2-2	13:03:00	0.06	0.66	98.175	495	80	80	0.245	2.375	18.593
2-3	13:08:00	0.10	1.10	100.550	447	80	80	0.316	3.180	24.003
2-4	13:13:00	0.10	1.10	103.730	386	81	80	0.316	3.095	24.003
2-5	13:18:00	0.06	0.66	106.825	369	80	80	0.245	2.285	18.593
2-6	13:23:00	0.06	0.66	109.110	402	82	81	0.245	2.280	18.593
2-7	13:28:00	0.26	2.90	111.390	471	83	81	0.510	4.905	38.704
2-8	13:33:00	0.32	3.50	116.295	432	84	81	0.566	5.400	42.938
2-9	13:38:00	0.26	2.90	121.695	414	84	81	0.510	5.095	38.704
2-10	13:43:00	0.19	2.10	126.790	402	84	81	0.436	4.270	33.086
2-11	13:48:00	0.14	1.60	131.060	378	85	82	0.374	3.635	28.401
2-12	13:53:00	0.11	1.20	134.695	324	85	82	0.332	2.953	25.175
	13:58:00			137.648						
Total				89.009		83.9	82.3		89.009	
Average			1.76		416.3	83.1		0.384		
Min			0.44		324.0	80.0		0.200		
Max			3.50		495.0	87.0		0.566		

Run 3-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Inlet
Source Condition: Normal

Date: 10/2/14
Start Time: 14:20
End Time: 16:24

DRY GAS METER CONDITIONS

ΔH:	1.90	in. H_2O
Meter Temperature, Tm:	79.9	°F
Sqrt ΔP:	0.406	In. H_2O
Stack Temperature, Ts:	427.9	°F
Meter Volume, Vm:	93.109	ft^3
Meter Volume, Vmstd:	89.480	dscf
Meter Volume, Vwstd:	33.168	wscf
Isokinetic Variance:	108.6	%I
Test Length	120.00	in mins.
Nozzle Diameter	0.398	in inches
Barometric Pressure	29.00	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	28.96	in. Hg. abs.
Carbon Dioxide:	3.60	%
Oxygen:	14.40	%
Nitrogen:	82	%
Gas Weight dry, Md:	29.152	lb/lb mole
Gas Weight wet, Ms:	26.136	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	31.567	fps
Volumetric Flow:	4,556	acfm
Volumetric Flow:	1,913	dscfm
Volumetric Flow:	2,622	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2018.4	ml	Silica Initial Wt.	850.4	grams
Final Impinger Content:	2685.9	ml	Silica Final Wt.	887.1	grams
Difference:	667.5		Difference:	36.7	
Total Water Gain:	704.2		Moisture, Bws:	0.270	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	14:20:00	0.12	1.30	38.686	493	79	79	0.346	3.404	26.945
1-2	14:25:00	0.22	2.40	42.090	473	82	80	0.469	4.315	36.484
1-3	14:30:00	0.19	2.10	46.405	401	82	80	0.436	4.035	33.905
1-4	14:35:00	0.14	1.50	50.440	391	82	80	0.374	3.630	29.104
1-5	14:40:00	0.17	1.90	54.070	449	82	80	0.412	4.050	32.071
1-6	14:45:00	0.19	2.10	58.120	480	83	81	0.436	4.110	33.905
1-7	14:50:00	0.14	1.50	62.230	417	83	82	0.374	3.610	29.104
1-8	14:55:00	0.18	2.00	65.840	433	84	8	0.424	4.205	33.001
1-9	15:00:00	0.17	1.90	70.045	427	84	81	0.412	3.785	32.071
1-10	15:05:00	0.15	1.60	73.830	389	85	82	0.387	3.835	30.126
1-11	15:10:00	0.04	0.43	77.665	371	85	82	0.200	2.240	15.557
1-12	15:15:00	0.04	0.43	79.905	360	86	82	0.200	1.588	15.557
	15:20:00			81.493						
2-1	15:24:00	0.34	3.70	81.493	493	83	81	0.583	5.517	45.356
2-2	15:29:00	0.31	3.40	87.010	456	83	81	0.557	5.265	43.308
2-3	15:34:00	0.31	3.40	92.275	407	82	81	0.557	5.320	43.308
2-4	15:39:00	0.27	3.00	97.595	424	82	81	0.520	5.035	40.418
2-5	15:44:00	0.17	1.90	102.630	401	82	81	0.412	3.885	32.071
2-6	15:49:00	0.14	1.50	106.515	379	81	81	0.374	3.700	29.104
2-7	15:54:00	0.22	2.40	110.215	431	81	80	0.469	4.250	36.484
2-8	15:59:00	0.16	1.80	114.465	457	81	80	0.400	4.140	31.114
2-9	16:04:00	0.14	1.50	118.605	429	81	80	0.374	3.430	29.104
2-10	16:09:00	0.14	1.50	122.035	478	81	80	0.374	3.450	29.104
2-11	16:14:00	0.11	1.20	125.485	434	80	79	0.332	3.305	25.798
2-12	16:19:00	0.10	1.10	128.790	397	80	79	0.316	3.005	24.598
	16:24:00			131.795						
Total				93.109		82.3	77.5		93.109	
Average			1.90		427.9	79.9		0.406		
Min			0.43		360.0	8.0		0.200		
Max			3.70		493.0	86.0		0.583		

Client:		Behr Iron & Metal		
Facility:		Rockford Facility		
Test Location:		TPU Baghouse Outlet		
Project #:		M143903		
Test Method:		5/12		
Test Engineer:		TFN		
Test Technician:		NY		
	R1	**R2**	**R3**	
Temp ID:	CM18	CM18	CM18	
Meter ID:	CM18	CM18	CM18	
Pitot ID:	170A	170A	170A	
Nozzle Diameter:	0.301	0.301	0.301	**in.**
Meter Calibration Factor (Y):	1.004	1.004	1.004	
Meter Orifice Setting (Delta H):	1.616	1.616	1.616	
Pitot Tube Coefficient:		0.840		
Probe Length:		4.0		**ft**
Probe Liner Material:		Teflon		
Nozzle Kit ID Number and Material:		7		
Sample Plane:		Horizontal		
Port Length:		6.00		**in.**
Port Size (diameter):		6.00		**in.**
Port Type:		Nipple		
Duct Shape:		Circular		
Diameter		1.5		**ft**
Duct Area:		1.767		**Sq. Ft.**
Upstream Diameters:		>.5		
Downstream Diameters:		>2		
Number of Ports Sampled:		2		
Number of Points per Port:		12		
Minutes per Point:		5.0		
Minutes per Reading:		5.0		
Total Number of Traverse Points:		24		
Test Length:		120		**min.**
Train Type:		Anderson Box		
Source Condition:		Normal		
Servomex Serial Number:		01440D1/4385		
Moisture Balance ID:		s10-39		
# of Runs		3		

Run 1-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Outlet
Source Condition: Normal

Date: 10/2/14
Start Time: 9:20
End Time: 11:27

DRY GAS METER CONDITIONS

ΔH:	1.32	in. H_2O
Meter Temperature, Tm:	77.9	°F
Sqrt ΔP:	0.556	in. H_2O
Stack Temperature, Ts:	281.6	°F
Meter Volume, Vm:	79.184	ft^3
Meter Volume, Vmstd:	76.650	dscf
Meter Volume, Vwstd:	18.774	wscf
Isokinetic Variance:	99.4	%I
Test Length	120.00	in mins.
Nozzle Diameter	0.301	in inches
Barometric Pressure	29.29	in Hg

STACK CONDITIONS

Static Pressure	0.50	in. H_2O
Flue Pressure (Ps):	29.33	in. Hg. abs.
Carbon Dioxide:	2.10	%
Oxygen:	17.90	%
Nitrogen:	80.00	%
Gas Weight dry, Md:	29.052	lb/lb mole
Gas Weight wet, Ms:	26.878	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	38.701	fps
Volumetric Flow:	4,103	acfm
Volumetric Flow:	2,300	dscfm
Volumetric Flow:	2,864	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2005.4	ml	Silica Initial Wt.	836.0	grams
Final Impinger Content:	2379.9	ml	Silica Final Wt.	860.1	grams
Difference:	374.5		Difference:	24.1	
Total Water Gain:	398.6		Moisture, Bws:	0.197	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	9:20:00	0.35	1.40	92.690	290	71	70	0.592	2.791	41.209
1-2	9:25:00	0.22	0.90	95.481	266	72	70	0.469	3.267	32.672
1-3	9:30:00	0.15	0.61	98.748	260	72	70	0.387	2.593	26.978
1-4	9:35:00	0.17	0.71	101.341	253	73	71	0.412	2.503	28.720
1-5	9:40:00	0.18	0.75	103.844	250	74	72	0.424	2.584	29.553
1-6	9:45:00	0.16	0.68	106.428	246	75	72	0.400	2.454	27.862
1-7	9:50:00	0.15	0.64	108.882	236	76	74	0.387	2.391	26.978
1-8	9:55:00	0.13	0.56	111.273	233	76	73	0.361	2.242	25.115
1-9	10:00:00	0.14	0.60	113.515	241	77	74	0.374	2.307	26.063
1-10	10:05:00	0.28	1.16	115.822	263	78	75	0.529	3.358	36.859
1-11	10:10:00	0.35	1.41	119.180	285	80	76	0.592	3.491	41.209
1-12	10:15:00	0.35	1.41	122.671	289	81	77	0.592	3.464	41.209
	10:20:00			126.135						
2-1	10:27:00	0.57	2.30	126.135	297	81	79	0.755	4.476	52.589
2-2	10:32:00	0.57	2.30	130.611	303	82	79	0.755	4.207	52.589
2-3	10:37:00	0.56	2.30	134.818	319	82	80	0.748	4.165	52.126
2-4	10:42:00	0.44	1.80	138.983	306	82	80	0.663	3.932	46.205
2-5	10:47:00	0.45	1.80	142.915	308	83	80	0.671	4.013	46.727
2-6	10:52:00	0.45	1.80	146.928	308	83	81	0.671	3.956	46.727
2-7	10:57:00	0.44	1.80	150.884	309	83	81	0.663	3.948	46.205
2-8	11:02:00	0.35	1.40	154.832	304	83	81	0.592	3.491	41.209
2-9	11:07:00	0.35	1.40	158.323	303	83	81	0.592	3.389	41.209
2-10	11:12:00	0.33	1.30	161.712	300	83	81	0.574	3.463	40.014
2-11	11:17:00	0.32	1.30	165.175	296	83	82	0.566	3.337	39.403
2-12	11:22:00	0.32	1.30	168.512	294	84	82	0.566	3.362	39.403
	11:27:00			171.874						
Total				79.184		79.0	76.7		79.184	
Average		1.32			281.6	77.9		0.556		
Min		0.56			233.0	70.0		0.361		
Max		2.30			319.0	84.0		0.755		

Run 2-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Outlet
Source Condition: Normal

Date: 10/2/14
Start Time: 11:55
End Time: 1:58

DRY GAS METER CONDITIONS

ΔH:	1.30	In. H_2O
Meter Temperature, Tm:	83.2	°F
Sqrt ΔP:	0.557	In. H_2O
Stack Temperature, Ts:	284.7	°F
Meter Volume, Vm:	79.571	ft^3
Meter Volume, Vmstd:	76.267	dscf
Meter Volume, Vwstd:	27.243	wscf
Isokinetic Variance:	106.2	%I
Test Length	120.00	in mins.
Nozzle Diameter	0.301	in inches
Barometric Pressure	29.29	in Hg

STACK CONDITIONS

Static Pressure	0.50	in. H_2O
Flue Pressure (Ps):	29.33	in. Hg. abs.
Carbon Dioxide:	2.40	%
Oxygen:	16.50	%
Nitrogen:	81.1	%
Gas Weight dry, Md:	29.044	lb/lb mole
Gas Weight wet, Ms:	26.137	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	39.441	fps
Volumetric Flow:	4,182	acfm
Volumetric Flow:	2,141	dscfm
Volumetric Flow:	2,906	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1896.0	ml	Silica Initial Wt.	841.2	grams
Final Impinger Content:	2440.6	ml	Silica Final Wt.	875.0	grams
Difference:	544.6		Difference:	33.8	
Total Water Gain:	578.4		Moisture, Bws:	0.263	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	11:55:00	0.35	1.41	79.645	284	84	83	0.592	3.642	41.874
1-2	12:00:00	0.35	1.41	83.287	281	85	83	0.592	3.536	41.874
1-3	12:05:00	0.34	1.37	86.823	284	86	83	0.583	3.421	41.272
1-4	12:10:00	0.34	1.37	90.244	294	86	83	0.583	3.543	41.272
1-5	12:15:00	0.34	1.37	93.787	296	86	84	0.583	3.331	41.272
1-6	12:20:00	0.33	1.33	97.118	300	86	84	0.574	3.470	40.660
1-7	12:25:00	0.61	2.45	100.588	329	87	84	0.781	4.537	55.281
1-8	12:30:00	0.61	2.45	105.125	333	86	84	0.781	4.608	55.281
1-9	12:35:00	0.60	2.41	109.733	337	86	84	0.775	4.588	54.826
1-10	12:40:00	0.45	1.81	114.321	330	86	84	0.671	3.824	47.481
1-11	12:45:00	0.25	1.00	118.145	299	85	83	0.500	3.143	35.390
1-12	12:50:00	0.18	0.72	121.288	295	85	83	0.424	2.760	30.030
	12:55:00			124.048						
2-1	12:58:00	0.15	0.60	124.048	270	82	82	0.387	2.433	27.413
2-2	1:03:00	0.15	0.60	126.481	270	83	82	0.387	2.263	27.413
2-3	1:08:00	0.28	1.10	128.744	290	82	81	0.529	3.147	37.453
2-4	1:13:00	0.25	1.00	131.891	277	82	81	0.500	2.882	35.390
2-5	1:18:00	0.25	1.00	134.773	264	82	81	0.500	2.955	35.390
2-6	1:23:00	0.22	0.88	137.728	257	82	81	0.469	2.794	33.199
2-7	1:28:00	0.35	1.40	140.522	287	83	81	0.592	3.393	41.874
2-8	1:33:00	0.42	1.70	143.915	286	83	81	0.648	3.918	45.871
2-9	1:38:00	0.18	0.72	147.833	242	83	81	0.424	2.588	30.030
2-10	1:43:00	0.22	0.88	150.421	238	83	81	0.469	2.804	33.199
2-11	1:48:00	0.28	1.10	153.225	236	83	81	0.529	3.093	37.453
2-12	1:53:00	0.25	1.00	156.318	253	82	80	0.500	2.898	35.390
	1:58:00			159.216						
Total				79.571		84.1	82.3		79.571	
Average		1.30			284.7	83.2		0.557		
Min		0.60			236.0	80.0		0.387		
Max		2.45			337.0	87.0		0.781		

Run 3-Method 5/12

Client: Behr Iron & Metal
Facility: Rockford Facility
Test Location: TPU Baghouse Outlet
Source Condition: Normal

Date: 10/2/14
Start Time: 2:20
End Time: 4:23

DRY GAS METER CONDITIONS

ΔH:	2.40	In. H_2O
Meter Temperature, Tm:	81.7	°F
Sqrt ΔP:	0.761	In. H_2O
Stack Temperature, Ts:	345.8	°F
Meter Volume, Vm:	107.529	ft^3
Meter Volume, Vmstd:	103.628	dscf
Meter Volume, Vwstd:	28.896	wscf
Isokinetic Variance:	104.7	%I
Test Length	120.00	in mins.
Nozzle Diameter	0.301	in inches
Barometric Pressure	29.29	in Hg

STACK CONDITIONS

Static Pressure	0.50	in. H_2O
Flue Pressure (Ps):	29.33	in. Hg. abs.
Carbon Dioxide:	2.90	%
Oxygen:	16.00	%
Nitrogen:	81.1	%
Gas Weight dry, Md:	29.104	lb/lb mole
Gas Weight wet, Ms:	26.683	lb/lb mole
Excess Air:	---	%
Gas Velocity, Vs:	55.428	fps
Volumetric Flow:	5,877	acfm
Volumetric Flow:	2,952	dscfm
Volumetric Flow:	3,775	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2004.8	ml	Silica Initial Wt.	843.6	grams
Final Impinger Content:	2587.1	ml	Silica Final Wt.	874.8	grams
Difference:	582.3		Difference:	31.2	
Total Water Gain:	613.5		Moisture, Bws:	0.218	

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Sqrt. Δp	Collected Vol. ft^3	Point Vel ft/sec
1-1	2:20:00	0.29	1.20	60.394	281	80	80	0.539	3.281	39.243
1-2	2:25:00	0.45	1.80	63.675	289	80	79	0.671	3.989	48.884
1-3	2:30:00	0.49	1.90	67.664	290	81	80	0.700	4.158	51.010
1-4	2:35:00	0.45	1.80	71.822	289	82	80	0.671	3.856	48.884
1-5	2:40:00	0.35	1.40	75.678	301	83	80	0.592	3.633	43.111
1-6	2:45:00	0.70	2.80	79.311	324	83	80	0.837	4.901	60.969
1-7	2:50:00	0.71	2.90	84.212	329	83	80	0.843	5.012	61.403
1-8	2:55:00	0.50	2.00	89.224	312	82	80	0.707	4.001	51.528
1-9	3:00:00	0.41	1.60	93.225	313	83	80	0.640	3.893	46.661
1-10	3:05:00	0.70	2.80	97.118	327	83	80	0.837	4.848	60.969
1-11	3:10:00	0.74	2.90	101.966	326	84	81	0.860	5.167	62.686
1-12	3:15:00	0.74	2.90	107.133	325	84	81	0.860	5.004	62.686
	3:20:00			112.137						
2-1	3:23:00	1.00	4.00	112.137	387	83	81	1.000	5.981	72.872
2-2	3:28:00	0.91	3.60	118.118	377	83	81	0.954	5.475	69.515
2-3	3:33:00	0.89	3.50	123.593	385	83	82	0.943	5.629	68.747
2-4	3:38:00	0.85	3.40	129.222	388	84	82	0.922	5.459	67.184
2-5	3:43:00	0.84	3.30	134.681	392	84	82	0.917	5.441	66.788
2-6	3:48:00	0.90	3.60	140.122	375	83	82	0.949	5.477	69.132
2-7	3:53:00	0.85	3.40	145.599	397	83	82	0.922	5.520	67.184
2-8	3:58:00	0.33	1.30	151.119	392	83	82	0.574	3.446	41.861
2-9	4:03:00	0.28	1.10	154.565	361	83	82	0.529	3.100	38.560
2-10	4:08:00	0.25	1.00	157.665	374	82	81	0.500	2.657	36.436
2-11	4:13:00	0.30	1.20	160.322	375	82	81	0.548	3.160	39.913
2-12	4:18:00	0.55	2.20	163.482	390	82	81	0.742	4.441	54.043
	4:23:00			167.923						
Total				107.529		82.6	80.8		107.529	
Average		2.40			345.8	81.7		0.761		
Min		1.00			281.0	79.0		0.500		
Max		4.00			397.0	84.0		1.000		

Appendix G - Field Data Sheets

Isokinetic Sampling Cover Sheet

Test Engineer: JHowe
Test Technician: BPT

Plant Information

Run Number: 1
Test Location: TPU Baghouse Inlet
Duct Shape: Circular or Rectangular
Flue Area: 2.405
Port Type: Nipple
Test Method: 5/2

Date: 10/2/14
Client Name: Joseph Behr + Sons Inc
Length: ____ Width: ____ or Diameter: 1.75
Upstream Diameters: 7.5
Port Length: 6"
Source Condition: Normal

Project Number: M143903
Plant Name: Rockford Facility
Downstream Diameters: 72
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM30
Pitot ID: 98
Nozzle Kit ID: Teflon 7
Probe Length: 3'
Pre-Test Nozzle Leak Check: ows @ 1D "Hg
Pre-Test Pitot Leak Check: Jes.5 "H_2O

Meter Y Value: 1.009
Pitot Coefficient: .84
Nozzle Diameter: .398
Probe Liner: Glass

ΔH Value: 1.737
Train Type: Hot Box
Filter Number/Weight: 7475 / 0.4727
Thimble Number/Weight: ____
Post-Test Nozzle Leak Check: ows @ 1D "Hg
Post-Test Pitot Leak Check: Jes "H_2O

Traverse Data

Ports Sampled: 2
Total Points: 24

Points/Port: 12
Total Test Time: 120

Min/Point: 5
Sample Plane: Horizontal or Vertical

Stack Parameters

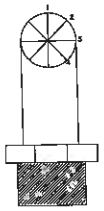
Barometric Pressure: 29.0
CO_2 %: ____ / ____ / ____ / Avg. 3.8
Imp and/or silica balance Model and S/N: S10-39
Initial Imp. Volume or Weight: 2016.5
Initial Silica Weight: 856.4

Static Pressure: -.6
O_2 %: ____ / ____ / ____ /Avg. 15.5
Final Imp. Volume or Weight: 2621.8
Final Silica Weight: 886.6

Determined by: Method 3 or Method 3A
Servomex Serial #: 0144DX/4385
Imp. Volume or Weight Gain: 605.3
Silica Weight Gain: 30

Comments:

Post-Test Nozzle Verification: 1) ✓ 2) ✓ 3) ✓ 4) ✓



DS-004 Method 5 Cover Sheet

Isokinetic Sampling Field Data Sheet

Project Number: M143403 | Date: 10/2/14 | Test Number: 1

Client: Joseph Behr & Sons Inc | Test Location: TPU Baghouse Inlet | Operator: JHowe | Test Tech: BPT

Plant: Rockford Facility | Test Method: 5/12 | Page Number: 1 of 1

11.007 1.917 <

Port-Point #	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	920	.19	2.00	65.806	.435	.809	4.045		419	72	70	4	250	249	64
2	925	.16	1.70	69.935	.400	.743	3.716	69.908	419	73	71	4	250	251	63
3	930	.108	1.24	73.710	.283	.526	2.628	73.624	446	74	71	3	251	247	60
4	935	.06	1.63	76.335	.245	.455	2.276	76.251	424	75	72	2	250	249	61
5	940	.05	.55	78.500	.224	.415	2.077	78.527	410	77	73	2	248	248	59
6	945	.05	.56	80.715	.224	.429	2.147	80.604	388	76	73	2	249	249	58
7	950	.09	1.00	82.609	.300	.576	2.882	82.751	418	76	73	3	250	251	54
8	955	.07	.78	85.630	.265	.508	2.539	85.631	320	77	73	3	251	250	53
9	1000	.06	.67	88.220	.245	.470	2.352	88.171	381	77	73	3	252	253	52
10	1005	.17	1.30	90.615	.346	.665	3.326	90.523	450	78	73	6	250	250	50
11	1010	.17	1.90	93.870	.412	.792	3.958	93.449	365	78	74	8	251	249	49
12	1015	.20	2.40	97.735	.447	.859	4.293	97.807	369	79	74	18	252	252	51
	1020			102.095				102.100							
2-1	1025	.21	2.30	102.095	.458	.880	4.349		461	83	79	11	250	250	50
2	1030	.18	2.00	106.390	.424	.815	4.066	106.444	456	82	78	11	248	249	52
3	1035	.16	1.80	110.385	.400	.767	3.834	110.511	402	84	80	11	247	250	51
4	1040	.16	1.80	114.385	.400	.767	3.834	114.345	403	83	80	11	249	251	50
5	1045	.13	1.40	118.020	.361	.691	3.457	118.179	454	84	82	10	250	250	54
6	1050	.13	1.40	121.480	.361	.691	3.456	121.635	426	83	81	10	251	248	56
7	1055	.11	1.20	124.835	.332	.636	3.179	125.091	435	85	81	9	250	249	55
8	1100	.11	1.20	128.110	.332	.636	3.179	128.269	429	83	81	9	248	251	59
9	1105	.10	1.10	131.405	.316	.604	3.021	131.448	390	83	81	9	247	250	60
10	1110	.12	1.30	134.500	.346	.664	3.320	134.479	305	83	81	9	250	248	61
11	1115	.16	1.80	137.840	.400	.767	3.834	137.799	310	83	81	10	251	249	62
12	1120	.14	1.50	141.745	.374	.717	3.584	141.633	295	83	81	9	250	251	61
	1125			145.472				145.729							

IMPINGER WEIGHT SHEET

PLANT: Joseph Behr Rockford Facility

UNIT NO: TPU Baghouse

LOCATION: Inlet

DATE: 10/1/14

TEST NO: 1

METHOD: 5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: S10-39

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	960.4	693.0		
IMPINGER 2	909.6	684.7		
IMPINGER 3	757.8	638.7		
IMPINGER 4	886.6	850.6		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2621.8 FINAL TOTAL	2016.4 INITIAL TOTAL	605.4 TOTAL IMPINGER GAIN
SILICA	886.6 FINAL TOTAL	856.6 INITIAL TOTAL	30 TOTAL SILICA GAIN

Isokinetic Sampling Cover Sheet

Test Engineer: HOWE
Test Technician: BPT

Plant Information

Run Number:	2	Date:	10/2/14	Project Number:	1147903
Test Location:	TPU Baghouse Inlet	Client Name:	Joseph Behr + Sons Inc	Plant Name:	Rockford Facility
Duct Shape:	Circular or Rectangular	Length:	—	Width: — or	Diameter: 1.75
Flue Area:	2.405	Upstream Diameters:	2.5	Downstream Diameters:	2
Port Type:	Nipple	Port Length:	6"	Port Diameter:	6"
Test Method:	5/17	Source Condition:	Normal		

Meter and Probe Data

Meter ID:	CM30	Meter Y Value:	1.009	ΔH Value:	1.737
Pitot ID:	98	Pitot Coefficient:	.84	Train Type:	Hot Box
Nozzle Kit ID	Teflon 7	Nozzle Diameter:	.1398	Filter Number/Weight:	7479 | 0.4751
Probe Length:	3'	Probe Liner:	Glass	Thimble Number/Weight:	—
Pre-Test Nozzle Leak Check:	good @ 10 "Hg	Post-Test Nozzle Leak Check:	good @ 10 "Hg		
Pre-Test Pitot Leak Check:	√ @ 3.5 "H_2O	Post-Test Pitot Leak Check:	√ @ 4 "H_2O		

Traverse Data

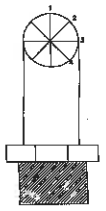
Ports Sampled:	2	Points/Port:	12	Min/Point:	5
Total Points:	24	Total Test Time:	120	Sample Plane: Horizontal or Vertical	

Stack Parameters

Barometric Pressure:	29.00	Static Pressure:	-.6		
CO_2 %: / / / Avg.	4.3	O_2 %: / / / Avg.	14.7	Determined by: Method 3 or Method 3A	
Imp and/or silica balance Model and S/N:	S10-39	Servomex Serial #:	01440D/4397		
Initial Imp. Volume or Weight:	2004.3	Final Imp. Volume or Weight:	2419.6	Imp. Volume or Weight Gain:	415.3
Initial Silica Weight:	809.2	Final Silica Weight:	828.9	Silica Weight Gain:	19.7

Comments:

Post-Test Nozzle Verification: 1) √ 2) √ 3) √ 4) √



DS-004 Method 5 Cover Sheet

Isokinetic Sampling Field Data Sheet

Project Number: 41439053 Date: 10/2/14 Test Number: 2

Client: Joseph Refrigerated Gas Inc Test Location: TPU Baghouse Inlet Operator: Steve Test Tech: BAT

Plant: Rockford Facility Test Method: 5/12 Page Number: 1 of 1

Port-Point #	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
(-)	1155	.14	1.50	48.638	.374	.776	3.581	~	454	83	82	3	250	251	60
2	1200	.16	1.80	52.305	.400	.769	3.828	52.219	445	83	81	3	250	249	62
3	1205	.14	1.50	56.115	.374	.776	3.581	56.047	430	86	84	5	249	250	64
4	1210	.16	1.80	59.715	.400	.773	3.864	59.628	420	86	84	6	248	248	64
5	1215	.13	1.40	63.540	.361	.697	3.483	63.492	447	85	84	4	247	249	62
6	1220	.16	1.80	67.095	.400	.773	3.864	66.975	456	86	84	5	240	250	63
7	1225	.31	3.40	70.905	.557	1.076	5.378	70.839	463	86	84	8	244	251	60
8	1230	.28	3.10	76.045	.529	1.022	5.112	76.247	422	86	84	8	247	250	61
9	1235	.28	3.10	81.220	.529	1.022	5.112	81.359	401	86	84	8	248	248	60
10	1240	.22	2.40	86.275	.469	.906	4.531	86.441	419	86	85	8	250	250	59
11	1245	.14	1.50	90.805	.332	.641	3.204	90.972	422	86	85	2	251	251	58
12	1250	.04	.44	94.085	.200	.386	1.932	94.176	335	87	85	2	252	250	57
	1255			96.223				96.208							
2-1	1258	.04	.44	96.273	.200	.386	1.932	~	356	81	80	2	249	251	58
2	1303	.06	.60	98.175	.245	.473	2.366	98.205	495	80	80	3	251	248	59
3	1308	.10	1.10	100.550	.316	.611	3.055	100.571	447	80	80	6	250	250	60
4	1313	.10	1.10	103.730	.316	.611	3.055	103.626	386	81	80	6	248	249	62
5	1318	.06	.60	106.825	.245	.473	2.366	106.681	369	80	80	4	249	250	64
6	1323	.06	.60	109.110	.245	.473	2.366	109.047	402	82	81	4	253	248	64
7	1328	.26	2.90	111.390	.510	.985	4.926	111.413	471	83	81	8	252	250	61
8	1333	.32	3.50	116.295	.566	1.093	5.465	116.339	432	84	81	9	250	248	62
9	1338	.26	2.90	121.695	.533	1.040	5.202	121.804	414	84	81	8	248	249	60
10	1343	.19	2.10	126.790	.436	.842	4.211	126.806	402	84	81	7	249	248	59
11	1348	.14	1.60	131.000	.374	.723	3.614	131.017	328	85	82	3	247	251	59
12	1353	.11	1.20	134.695	.332	.641	3.204	134.831	324	85	82	2	250	252	58
	1358			137.648				138.035							

IMPINGER WEIGHT SHEET

PLANT: Joseph Rehr Rockford Facility

UNIT NO: TP11 Baghouse

LOCATION: Inlet

DATE: 10/2/14

TEST NO: 2

METHOD: M5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: 5/5-39

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	929.2	730.6		
IMPINGER 2	886.4	679.3		
IMPINGER 3	604	594.4		
IMPINGER 4	828.9	809.2		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2419.6 FINAL TOTAL	2004.3 INITIAL TOTAL	415.3 TOTAL IMPINGER GAIN
SILICA	828.9 FINAL TOTAL	809.2 INITIAL TOTAL	19.7 TOTAL SILICA GAIN

Isokinetic Sampling Cover Sheet

Test Engineer: JHare
Test Technician: TSPT

Plant Information

Run Number: 3
Test Location: TPU Baghouse Outlet
Duct Shape: Circular or Rectangular
Flue Area: 2.405
Port Type: Nipple
Test Method: 5/1

Date: 10/2/14
Client Name: Joseph Behrsons Inc
Length: — Width: — or Diameter: 7.75
Upstream Diameters: 2.5
Port Length: 6"
Source Condition: Normal

Project Number: 4143963
Plant Name: Rockford Facility
Downstream Diameters: 72
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM30
Pitot ID: 98
Nozzle Kit ID: Teflon
Probe Length: 3
Pre-Test Nozzle Leak Check: 1 cfm @ 15 "Hg
Pre-Test Pitot Leak Check: ✓ @ 3.5 "H_2O

Meter Y Value: 1.009
Pitot Coefficient: .84
Nozzle Diameter: .358
Probe Liner: Glass

ΔH Value: 1.737
Train Type: Hot Box
Filter Number/Weight: 7473 / 0.4736
Thimble Number/Weight: —
Post-Test Nozzle Leak Check: leak @ 10 "Hg
Post-Test Pitot Leak Check: ✓ "H_2O

Traverse Data

Ports Sampled: 2
Total Points: 24

Points/Port: 12
Total Test Time: 120

Min/Point: 5
Sample Plane: Horizontal or Vertical

Stack Parameters

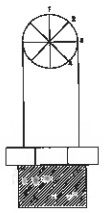
Barometric Pressure: 29.00
CO_2 %: ___ / ___ / ___ / Avg. 3.6
Imp and/or silica balance Model and S/N: S10-39
Initial Imp. Volume or Weight: 2018.4
Initial Silica Weight: 850.9

Static Pressure: -.6
O_2 %: ___ / ___ / ___ /Avg. 14.4
Final Imp. Volume or Weight: 2685.9
Final Silica Weight: 887.1

Determined by: Method 3 or Method 3A
Servomex Serial #: 01440D/1435
Imp. Volume or Weight Gain: 667.5
Silica Weight Gain: 36.7

Comments:

Post-Test Nozzle Verification: 1) ✓ 2) ✓ 3) ✓ 4) ✓



Isokinetic Sampling Field Data Sheet

Project Number: M1439113 | Date: 10/2/14 | Test Number: 3

Client: Joseph Behr & Sons Inc | Test Location: TRU Baghouse Inlet | Operator: JHouse | Test Tech: RPT

Plant: Rockford Facility | Test Method: 5/17 | Page Number: 1 of 1

10,973 | 1,914 x 5

Port-Point #	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1420	.12	1.30	38.685	.346	.463	3.315		413	79	78	4	250	249	62
2	1425	.12	1.40	42.090	.469	.859	4.489	47.001	423	82	80	8	250	251	61
3	1430	.19	2.10	46.405	.435	.533	4.171	46.481	401	82	80	7	252	250	63
4	1435	.14	1.50	50.440	.374	.716	3.581	50.062	391	82	80	4	249	250	64
5	1440	.17	1.90	54.070	.412	.789	3.946	54.233	419	82	80	8	249	251	65
6	1445	.19	2.10	58.170	.435	.834	4.171	58.179	480	83	81	8	251	250	63
7	1450	.14	1.50	62.230	.374	.716	3.581	62.35	417	83	81	5	252	249	60
8	1455	.18	2.00	66.840	.424	.812	4.060	66.931	435	84	81	8	250	250	61
9	1500	.17	1.90	70.045	.412	.789	3.946	69.991	427	84	81	8	250	251	59
10	1505	.15	1.60	73.830	.387	.741	3.706	73.937	389	85	82	6	249	250	58
11	1510	.04	.43	77.665	.200	.383	1.914	77.643	371	85	82	2	250	248	57
12	1515	.104	.43	79.705	.200	.383	1.915	79.557	360	86	82	2	248	250	60
	1520			81.493				81.471							
2-1	1524	.34	3.70	81.493	.583	1.116	5.5802		413	83	81	12	249	251	64
2	1529	.31	3.40	87.010	.553	1.066	5.328	87.073	426	83	81	11	250	250	62
3	1534	.31	3.40	92.275	.553	1.066	5.328	92.401	407	82	81	11	251	248	60
4	1539	.27	3.00	97.595	.518	.995	4.973	97.729	424	82	81	10	254	250	61
5	1544	.17	1.90	102.630	.412	.789	3.946	102.702	401	82	81	8	254	249	61
6	1549	.14	1.50	106.515	.374	.716	3.581	106.648	379	81	81	7	250	251	60
7	1554	.22	2.40	110.215	.469	.859	4.489	110.729	431	81	80	9	251	250	59
8	1559	.16	1.80	114.465	.460	.776	3.878	114.718	457	81	80	6	252	248	58
9	1604	.14	1.50	118.605	.374	.716	3.581	118.546	429	81	80	5	252	249	60
10	1609	.14	1.50	122.035	.374	.716	3.581	122.127	47[illegible]	81	80	5	253	250	62
11	1614	.11	1.20	125.485	.332	.635	3.174	125.708	434	80	79	4	250	249	64
12	1619	.110	1.10	128.790	.316	.605	3.026	128.882	397	80	79	4	251	252	60
	1624			131.795				131.908							

IMPINGER WEIGHT SHEET

PLANT: Joseph Betz Backend Facility

UNIT NO: TPU Baghouse

LOCATION: Inlet

DATE: 10/2/14

TEST NO: 3

METHOD: 5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: SW-39

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	940.9	689.6		
IMPINGER 2	872.0	691.0		
IMPINGER 3	873.0	637.8		
IMPINGER 4	887.1	850.4		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2685.9 FINAL TOTAL	2018.4 INITIAL TOTAL	667.5 TOTAL IMPINGER GAIN
SILICA	887.1 FINAL TOTAL	850.4 INITIAL TOTAL	36.7 TOTAL SILICA GAIN

Isokinetic Sampling Cover Sheet

Test Engineer: TFN
Test Technician: mr

Plant Information

Run Number: 1
Test Location: TPU Bag House Outlet
Duct Shape: (Circular) or Rectangular
Flue Area: 1.767 ft
Port Type: nipple
Test Method: MS

Date: 10-2-14
Client Name: Behr
Length: N/A Width: N/A or Diameter: 1.5 ft
Upstream Diameters: >0.5
Port Length: 6 in
Source Condition: normal

Project Number: M147903
Plant Name: Rockford facility
Downstream Diameters: > 2
Port Diameter: 6 in

Meter and Probe Data

Meter ID: CM 18
Pitot ID: 170A
Nozzle Kit ID: teflon #7
Probe Length: 4 ft
Pre-Test Nozzle Leak Check: .00 @ 8 "Hg
Pre-Test Pitot Leak Check: 0 @ 6 "H_2O

Meter Y Value: 1.004
Pitot Coefficient: 0.84
Nozzle Diameter: 0.301
Probe Liner: glass

ΔH Value: 1.616
Train Type: anderson
Filter Number/Weight: #7474
Thimble Number/Weight: —
Post-Test Nozzle Leak Check: .00 @ 12 "Hg
Post-Test Pitot Leak Check: 0 @ 6 "H_2O

Traverse Data

Ports Sampled: 2
Total Points: 24

Points/Port: 12
Total Test Time: 120 min

Min/Point: 5
Sample Plane: (Horizontal) or Vertical

Stack Parameters

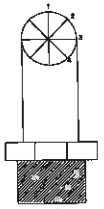
Barometric Pressure: 29.29
CO_2 %: / / / Avg. 2.1
Imp and/or silica balance Model and S/N: 510-39
Initial Imp. Volume or Weight: 2005.4
Initial Silica Weight: 2379.9

Static Pressure: 0.5
O_2 %: / / / Avg. ~~17.90~~
Final Imp. Volume or Weight: 2379.4
Final Silica Weight: 860.1

Determined by: Method 3 or Method 3A
Servomex Serial #: 0144001 / 4385
Imp. Volume or Weight Gain: 374.5
Silica Weight Gain: 24.1

Comments:

Post-Test Nozzle Verification: 1) X 2) X 3) X 4) X



DS-004 Method 5 Cover Sheet

Isokinetic Sampling Field Data Sheet

Project Number: M143903 | Date: 10-2-14 | Test Number: 1

Client: Behr | Test Location: TPU Paint House Outlet | Operator: JFN | Test Tech: MK

Plant: Rockford facility | Test Method: M5 | Page Number: 1 of 1

Port-Point #	Time	(ΔP)	K.4.019 Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	K1.180 Meter Rate, Cubic Feet/ Min.	X5 Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1 - 1	0920	.35	1.4	92.690	.591	.526	2.632		290	71	70	4	251	250	54
2	0925	.22	.90	95.481	.469	.455	2.277	96 181	266	72	70	5.5	252	251	51
3	0930	.15	.61	98.748	.387	.457	2.285	98.996	257	72	71	3.5	251	250	52
4	0935	.17	.71	101.341	.412	.486	2.430	101.331	253	74	71	4.0	250	254	54
5	0940	.18	.76	103.844	.424	.500	2.500	103.761	250	74	72	4.0	250	251	55
6	0945	.16	.68	106.428	.400	.472	2.360	106.417	246	75	72	4.0	250	250	55
7	0950	.15	.64	108.882	.387	.457	2.285	108.X64	236	76	74	4.0	250	251	57
8	0955	.13	.56	111.273	.360	.425	2.127	111.256	233	76	73	4.0	251	251	56
9	1000	.14	.60	113.515	.374	.441	2.207	113.486	241	77	74	4.0	251	250	56
10	1005	.28	1.16	115.822	.529	.624	3.121	115.791	263	78	75	4.0	250	250	56
11	1010	.35	1.41	119.180	.591	.698	3.490	119.006	285	80	76	6.0	250	250	58
12	1015	.35	1.41	122.671	.591	.698	3.490	122.558	289	81	77				
	1020			126.135				126.107							
2 - 1	1027	.57	2.3	126.135	.755	.891	4.455		297	81	79	10.0	250	250	59
2	1032	.57	2.3	130.611	.755	.891	4.455	130.590	303	82	79	10.0	251	250	60
3	1037	.56	2.3	134.818	.748	.883	4.415	134.455	319	82	80	12.0	252	251	60
4	1042	.44	1.8	138.983	.663	.783	3.914	138.870	306	82	80	12.0	250	251	60
5	1047	.45	1.8	142.915	.671	.791	3.957	142.784	308	83	80	12.0	252	250	62
6	1052	.45	1.8	146.928	.671	.791	3.957	146.741	308	82	81	12.0	250	250	62
7	1057	.44	1.8	150.884	.663	.783	3.914	150.698	309	83	81	12.0	250	250	61
8	1102	.35	1.4	154.832	.592	.698	3.490	154.612	304	83	81	12.0	250	250	60
9	1107	.35	1.4	158.323	.592	.698	3.490	158.102	303	83	81	12.0	251	250	60
10	1112	.33	1.3	161.712	.574	.677	3.389	161.592	300	82	X1	12.0	250	252	61
11	1117	.32	1.3	165.175	.566	.667	3.337	164.981	296	83	82	11.0	250	250	60
12	1122	.32	1.3	168.512	.566	.667	3.337	168.318	294	84	82	11.0	250	251	60
	1127			171.874				171.655							

IMPINGER WEIGHT SHEET

PLANT: Joseph Bahr Rockford Facility

UNIT NO: TPU Baghouse

LOCATION: Stack

DATE: 10/2/14

TEST NO: 1

METHOD: 5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: 510-39

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	995	749.2		
IMPINGER 2	839.6	729.2		
IMPINGER 3	545.3	527.0		
IMPINGER 4	860.1	836.0		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2379.9 FINAL TOTAL	2005.4 INITIAL TOTAL	374.5 TOTAL IMPINGER GAIN
SILICA	860.1 FINAL TOTAL	836.0 INITIAL TOTAL	24.1 TOTAL SILICA GAIN

Isokinetic Sampling Cover Sheet

Test Engineer: TFN
Test Technician: MY

Plant Information

Run Number: 2
Test Location: TPU Boiler House Outlet
Duct Shape: Circular or Rectangular
Flue Area: 1.767 ft
Port Type: nipple
Test Method: M5

Date: 10-2-14
Client Name: Joseph Benr
Length: N/A Width: N/A or Diameter: 1.5 ft
Upstream Diameters: > 0.5
Port Length: 6 in
Source Condition: normal

Project Number: M143903
Plant Name: Rockford Facility
Downstream Diameters: > 2
Port Diameter: 6 in

Meter and Probe Data

Meter ID: CM18
Pitot ID: 170 A
Nozzle Kit ID: teflon #7
Probe Length: 4 ft
Pre-Test Nozzle Leak Check: .00 @ 12 "Hg
Pre-Test Pitot Leak Check: 0 @ 6 "H_2O

Meter Y Value: 1.004
Pitot Coefficient: 0.84
Nozzle Diameter: 0.301
Probe Liner: glass

ΔH Value: 1.616
Train Type: anderson
Filter Number/Weight: #7478 / .4715 g
Thimble Number/Weight:
Post-Test Nozzle Leak Check: .00 @ 12 "Hg
Post-Test Pitot Leak Check: 0 @ 7 "H_2O

Traverse Data

Ports Sampled: 2
Total Points: 24

Points/Port: 12
Total Test Time: 120 min

Min/Point: 5 min
Sample Plane: ~~Horizontal~~ or Vertical

Stack Parameters

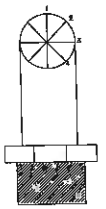
Barometric Pressure: 29.29
CO_2 %: / / / Avg. 2.4
Imp and/or silica balance Model and S/N: S10-39
Initial Imp. Volume or Weight: 1896
Initial Silica Weight: 841.2

Static Pressure: 0.5
O_2 %: / / / /Avg. 16.5
Servomex Serial #: 0144001 / 4385
Final Imp. Volume or Weight: 2440.6
Final Silica Weight: 875

Determined by: Method 3 or Method 3A
Imp. Volume or Weight Gain: 544.6
Silica Weight Gain: 33.8

Comments:

Post-Test Nozzle Verification: 1) ✓ 2) ✓ 3) — 4) —



DS-004 Method 5 Cover Sheet

Isokinetic Sampling Field Data Sheet

Project Number: M143903 Date: 10-2-14 Test Number: 2

Client: Behr Test Location: TPH Paint House Outlet Operator: TFN Test Tech: MK

Plant: Blackford facility Test Method: M-5 Page Number: 1 of 1

Port-Point #	Time	(ΔP)	K 4.019 Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	K 1.180 Meter Rate, Cubic Feet/ Min.	X 5 Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1155	.35	1.4	79.645	.591	.698	3.490		284	84	83	4.0	250	251	60
2	1200	.35	1.4	83.287	.591	.698	3.490	82.135	281	85	83	4.0	250	250	58
3	1205	.34	1.4	86.823	.583	.688	3.440	86.625	284	86	83	4.0	250	250	57
4	1210	.34	1.4	90.244	.583	.688	3.440	90.065	294	86	83	4.0	254	250	59
5	1215	.34	1.4	93.787	.583	.688	3.440	93.505	296	86	84	4.0	251	250	60
6	1220	.33	1.4	97.118	.574	.677	3.389	96.945	300	86	84	3.5	251	255	60
7	1225	.61	2.5	100.588	.781	.921	4.608	100.234	329	87	84	4.0	251	255	60
8	1230	.61	2.5	105.125	.781	.921	4.608	104.942	333	86	84	4.5	250	251	61
9	1235	.60	2.4	109.733	.774	.914	4.570	109.550	337	86	84	5.0	250	250	61
10	1240	.45	1.8	114.321	.671	.791	3.957	114.120	330	86	84	5.0	250	250	61
11	1245	.25	1.0	118.145	.500	.590	2.950	118.077	299	85	83	5.0	250	250	60
12	1250	.18	.72	121.288	.424	.501	2.503	121.027	295	85	83	4.5	250	250	60
	1255			124.048				123.530							
2-1	1258	.15	.60	124.098	.387	.457	2.285		270	82	82	3.0	250	250	61
2	1303	.15	.60	126.481	.387	.457	2.285	126.333	270	83	82	3.0	250	251	61
3	1308	.28	1.1	128.744	.529	.624	3.122	128.618	290	82	81	3.0	252	250	61
4	1313	.25	1.0	131.891	.500	.590	2.950	131.740	277	82	81	3.0	250	251	61
5	1318	.25	1.0	134.773	.500	.590	2.950	134.690	264	82	81	3.0	251	251	60
6	1323	.22	.88	137.728	.469	.553	2.767	137.640	257	82	81	3.5	250	250	61
7	1328	.35	1.4	140.522	.591	.698	3.490	140.407	287	83	81	3.5	252	250	60
8	1333	.42	1.7	143.915	.648	.765	3.823	143.897	286	82	81	3.5	250	251	60
9	1338	.18	.72	147.833	.424	.501	2.503	147.720	242	83	81	4.5	250	250	61
10	1343	.22	.88	150.421	.469	.553	2.767	150.223	238	83	81	3.0	250	250	63
11	1348	.28	1.1	153.225	.529	.624	3.122	152.990	236	83	81	3.5	250	250	63
12	1353	.25	1.0	156.318	.500	.590	2.950	156.112	253	82	80	3.5	251	251	63
	1358			159.216				159.062							

IMPINGER WEIGHT SHEET

PLANT: Joseph Behr Rockford Facility

UNIT NO: TPU Baghouse

LOCATION: Outlet Stack

DATE: 10/2/14

TEST NO: 2

METHOD: 5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: 910-34

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	895.2	600.6		
IMPINGER 2	886.4	699.6		
IMPINGER 3	659	606.6		
IMPINGER 4	875.9	841.2		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2440.6 FINAL TOTAL	1896 INITIAL TOTAL	544.6 TOTAL IMPINGER GAIN
SILICA	875.9 FINAL TOTAL	841.2 INITIAL TOTAL	34.7 TOTAL SILICA GAIN

Isokinetic Sampling Cover Sheet

Test Engineer: TFN
Test Technician: MY

Plant Information

Run Number: 3
Test Location: TPU Bag House Outlet
Duct Shape: ~~Circular~~ or Rectangular
Flue Area: 1.767 ft
Port Type: nipple
Test Method: M5

Date: 10-2-14
Client Name: BCI
Length: N/A Width: N/A or Diameter: 1.5 ft
Upstream Diameters: > 0.5
Port Length: 6 in
Source Condition: normal

Project Number: M143903
Plant Name: Rockford Facility
Downstream Diameters: > 2
Port Diameter: 6 in

Meter and Probe Data

Meter ID: CM 18
Pitot ID: 170 A
Nozzle Kit ID teflon #7
Probe Length: 4 ft
Pre-Test Nozzle Leak Check: .015 @ 10 "Hg
Pre-Test Pitot Leak Check: 0 @ 6 "H_2O

Meter Y Value: 1.004
Pitot Coefficient: 0.84
Nozzle Diameter: 0.301
Probe Liner: glass

ΔH Value: 1.616
Train Type: anderson
Filter Number/Weight: #7470
Thimble Number/Weight: N/A
Post-Test Nozzle Leak Check: .00 @ 15 "Hg
Post-Test Pitot Leak Check: 0 @ 8 "H_2O

Traverse Data

Ports Sampled: 2
Total Points: 24

Points/Port: 12
Total Test Time: 120 min

Min/Point: 5 min
Sample Plane: Horizontal or Vertical

Stack Parameters

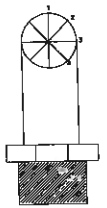
Barometric Pressure: 29.29
CO_2 %: / / / Avg. 29
Imp and/or silica balance Model and S/N: 510-39
Initial Imp. Volume or Weight: 2004.8
Initial Silica Weight: 843.6

Static Pressure: 0.5
O_2 %: / / / Avg. 16.70
Final Imp. Volume or Weight: 2587.1
Final Silica Weight: 874.8

Determined by: Method 3 or Method 3A
Servomex Serial #: 0144001 / 14385
Imp. Volume or Weight Gain: 582.3
Silica Weight Gain: 31.2

Comments:

Post-Test Nozzle Verification: 1) ✓ 2) ✓ 3) ✓ 4) ✓



DS-004 Method 5 Cover Sheet

Isokinetic Sampling Field Data Sheet

Project Number: M143903 | Date: 10-2-14 | Test Number: 3

Client: Behr | Test Location: TRU Duct Above Outlet | Operator: TFN | Test Tech: MV

Plant: Rockford Facility | Test Method: M5 | Page Number: 1 of 1

Port-Point #	Time	(ΔP)	K_1 4.019 Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	x 1.180 Meter Rate, Cubic Feet/ Min.	x5 Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1 - 1	1420	.29	1.2	60.396	.538	.635	3.177		281	80	80	4.5	250	250	60
2	1425	.45	1.8	63.675	.671	.791	3.957	63.571	289	80	79	5.5	250	250	51
3	1430	.49	1.9	67.664	.700	.826	4.130	67.528	290	81	80	6.5	255	250	51
4	1435	.45	1.8	71.822	.671	.791	3.957	71.658	289	82	80	7.0	250	250	49
5	1440	.35	1.4	75.678	.591	.698	3.490	75.615	301	83	80	7.5	252	250	52
6	1445	.70	2.8	79.311	.836	.987	4.936	79.105	324	83	80	8.0	250	250	52
7	1450	.71	2.9	84.212	.842	.994	4.971	84.041	329	83	80	9.0	250	250	56
8	1455	.50	2.0	89.224	.707	.834	4.171	89.012	312	82	80	8.5	251	254	56
9	1500	.41	1.6	93.225	.640	.755	3.777	93.183	313	83	80	7.0	250	255	58
10	1505	.70	2.8	97.118	.836	.987	4.936	96.960	327	83	80	7.0	250	252	57
11	1510	.74	2.9	101.966	.860	1.01	5.075	101.896	326	84	81	9.5	251	250	59
12	1515	.74	2.9	107.133	.860	1.01	5.075	106.971	325	84	81	10.0	250	250	60
	1520			112.137				112.046							
2 - 1	1523	1.0	4.0	112.137	1.00	1.18	5.900		387	83	81	11.5	250	252	61
2	1528	.91	3.6	118.118	.953	1.12	5.628	118.037	377	83	81	11.0	251	250	58
3	1533	.89	3.5	123.593	.943	1.11	5.566	123.665	385	83	82	11.0	250	251	59
4	1538	.85	3.4	129.222	.921	1.08	5.439	129.231	388	84	82	11.0	250	251	61
5	1543	.84	3.3	134.681	.916	1.08	5.407	134.670	392	84	82	11.0	250	252	62
6	1548	.90	3.6	140.122	.948	1.11	5.597	140.077	375	83	82	12.0	251	250	63
7	1553	.85	3.4	145.599	.921	1.08	5.439	145.674	397	83	82	12.0	250	252	63
8	1558	.33	1.3	151.119	.574	.677	3.389	151.113	392	83	82	12.0	250	250	64
9	1603	.28	1.1	154.565	.529	.624	3.121	154.502	361	83	82	12.0	250	250	65
10	1608	.25	1.0	157.665	1.00	.500	2.500	157.623	374	82	81	12.0	250	251	66
11	1613	.30	1.2	160.322	.547	.646	3.231	160.123	375	82	81	8.0	251	251	66
12	1618	.55	2.2	163.482	.741	.875	4.375	163.354	390	82	81	8.0	250	251	65
	1623			167.923				167.729							

IMPINGER WEIGHT SHEET

PLANT: Joseph Bohr Rockford Facility

UNIT NO: TPU Baghouse

LOCATION: STACK

DATE: 10/2/14

TEST NO: 3

METHOD: 5/12

WEIGHED/MEASURED BY: SS

BALANCE ID: SW-39

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	962.4	749.1		
IMPINGER 2	968.7	727.4		
IMPINGER 3	656.0	528.1		
IMPINGER 4	874.8	843.6		
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2587.1 FINAL TOTAL	2004.8 INITIAL TOTAL	582.3 TOTAL IMPINGER GAIN
SILICA	874.8 FINAL TOTAL	843.6 INITIAL TOTAL	31.2 TOTAL SILICA GAIN

Volumetric Flow Rate Determination Field Data Sheet

Project Number: M143903
Client: Joseph Behr & Sons Inc
Test Location: TPU Baghouse Inlet
Source Condition: Normal
Test Engineer: JHOWE

Date: 10/11/14
Test Number: Null Point
Start Time: 1738
End Time: 1804
Test Tech: NH

Duct Diameter 1.75 ft
Flue Area _____ ft²
Port Length _____ "
P_{bar} _____ "Hg
Static _____ "H_2O
Static _____ "Hg
P_s _____ "Hg

CO_2 % _____
O_2 % _____
N_2 % _____
Meter No CM30

Upstream Disturbance, Diameters _____
Downstream Disturbance, Diameters _____
Pitot ID _____ Pitot Coefficient (C_p) .84
Wet Bulb Temp _____
Dry Bulb Temp _____
B_{ws} _____
Fluke # _____

Leak Checks Passed@
Pre _____ Inches H_2O
Post _____ Inches H_2O
Umbilical ID ___

Port-Point #	ΔP	Temp. °F	$\sqrt{\Delta P}$	Null Point Angle, Degrees	Port-Point #	ΔP	Temp. °F	$\sqrt{\Delta P}$	Null Point Angle, Degrees
1-1	.26	424		6	2-1	.15	352		4
2	.24	423		8	2	.17	425		1
3	.21	411		9	3	.16	439		2
4	.19	420		10	4	.14	415		5
5	.20	492		14	5	.15	405		4
6	.20	478		12	6	.11	417		3
7	.19	437		14	7	.13	425		4
8	.16	388		6	8	.14	439		8
9	.15	392		3	9	.13	484		2
10	.17	445		9	10	.12	491		0
11	.18	479		11	11	.11	471		2
12	.15	460		7	12	.13	425		5
Average									

44 x CO_2% + .32 x O_2% + .28 x N_2% = _____ (Md)

(_____ Md x _____ 1-Bws) + (18 x _____ Bws) = _____ (Ms)

85.49 x ____ Cp x $\sqrt{\frac{(\quad)Ts\ °R}{Ms \times Ps}}$ x ____ $\sqrt{\Delta P}$ = ____ ft/sec (Vs)

_____ Vs x _____ Flue Area x 60 = _____ acfm

17.647 x _____ acfm x $\frac{Ps}{Ts\ °R}$ = _____ scfm x 60 = _____ scfh

1. 9.92 9.10.49
2. 1.34 10.17.08
3. 2.36 11.18.70
4. 3.55 12.19.62
5. 5.01
6. 7.13
7. 12.91
8. 15.08

Appendix H - Calibration Data

MOSTARDI PLATT

Procedures for Method 5 and Flow Calibration

Nozzles

The nozzles are measured according to Method 5, Section 5.1

Dry Gas Meters

The test meters are calibrated according to Method 5, Section 5.3 and "Procedures for Calibrating and Using Dry Gas Volume Meters as Calibration Standards" by P.R. Westlin and R.T. Shigehara, March 10, 1978.

Analytical Balance

The accuracy of the analytical balance is checked with Class S, Stainless Steel Type 303 weights manufactured by F. Hopken and Son, Jersey City, New Jersey.

Temperature Sensing Devices

The potentiometer and thermocouples are calibrated utilizing a NBS traceable millivolt source.

Pitot Tubes

The pitot tubes utilized during this test program are manufactured according to the specification described and illustrated in the *Code of Federal Regulations*, Title 40, Part 60, Appendix A, Methods 1 and 2. The pitot tubes comply with the alignment specifications in Method 2, Section 4; and the pitot tube assemblies are in compliance with specifications in the same section.

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM18	Date:	September 26, 2014
Standard Meter No.	16745468	Calibrated By:	TFN
Standard Meter (Y)	1.0039	Barometric Pressure:	29.59

Run Number	Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		43.425	60.658	71	73	72					
Initial		38.334	55.555	70	71	71					
Difference 1	0.20	5.091	5.103	71	72	72	72	18	8	1.000	1.438
Final		48.845	66.060	71	73	72					
Initial		43.763	60.978	71	72	72					
Difference 2	0.50	5.082	5.082	71	73	72	72	12	5	1.001	1.603
Final		54.752	71.953	72	74	73					
Initial		49.633	66.843	71	73	73					
Difference 3	0.70	5.119	5.110	72	74	73	73	10	19	1.003	1.613
Final		60.786	77.972	72	74	73					
Initial		55.286	72.490	71	73	73					
Difference 4	0.90	5.500	5.482	72	74	73	73	9	52	1.004	1.643
Final		66.970	84.148	72	74	73					
Initial		61.676	78.874	71	74	73					
Difference 5	1.20	5.294	5.274	72	74	73	74	8	28	1.005	1.740
Final		38.003	55.217	70	71	71					
Initial		32.367	49.662	70	71	71					
Difference 6	2.00	5.636	5.555	70	71	71	71	6	49	1.011	1.657
								Average		**1.004**	**1.616**

Stack Temperature Sensor Calibration

Meter Box # : CM18 *Name :* TFN

Ambient Temperature : 71 °F *Date :* September 26, 2014

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : December 13, 2013

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	0	0.0
250	252	0.3
600	604	0.4
1200	1212	0.7

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM30	Date:	September 24, 2014
Standard Meter No.	16745468	Calibrated By:	SVD
Standard Meter (Y)	1.0039	Barometric Pressure:	29.62

Run Number	Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		29.921	89.247	75	76	75					
Initial		24.669	84.002	74	75	74					
Difference 1	0.20	5.252	5.245	75	76	75	75	20	30	1.002	1.740
Final		44.640	103.876	74	78	75					
Initial		39.326	98.610	74	75	74					
Difference 2	0.50	5.314	5.266	74	77	75	76	13	4	1.011	1.722
Final		49.876	109.090	74	78	76					
Initial		44.640	103.876	74	78	75					
Difference 3	0.70	5.236	5.214	74	78	76	77	10	49	1.008	1.697
Final		54.967	114.144	74	79	76					
Initial		49.876	109.090	74	78	76					
Difference 4	0.90	5.091	5.054	74	79	76	77	9	17	1.011	1.699
Final		60.430	119.573	75	79	76					
Initial		54.967	114.144	74	79	76					
Difference 5	1.20	5.463	5.429	75	79	76	78	8	50	1.009	1.784
Final		24.415	83.750	74	75	74					
Initial		17.603	77.031	71	73	74					
Difference 6	2.00	6.812	6.719	73	74	74	74	8	32	1.012	1.782
							Average			**1.009**	**1.737**

Stack Temperature Sensor Calibration

Meter Box # : CM30 *Name :* SVD

Ambient Temperature : 70 °F *Date :* September 24, 2014

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : August 7, 2012

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	3	0.7
250	252	0.3
600	602	0.2
1200	1201	0.1

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

Dry Gas Meter Calibration Data

Dry Gas Meter No.	*CM30*	*Date:*	*October 15, 2014*
Standard Meter No.	*14152939*	*Calibrated By:*	*SVD*
Standard Meter (Y)	*1.0010*	*Barometric Pressure:*	*29.09*

Run Number		Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final			69.648	43.837	70	70	68					
Initial			64.469	38.662	68	67	66					
Difference	1	0.20	5.179	5.175	69	69	67	68	20	13	0.998	1.760
Final			74.870	49.032	71	71	69					
Initial			69.648	43.837	70	70	68					
Difference	2	0.50	5.222	5.195	71	71	69	70	12	43	1.002	1.716
Final			80.856	55.000	73	74	71					
Initial			74.870	49.032	71	71	69					
Difference	3	0.70	5.986	5.968	72	73	70	71	12	28	1.000	1.762
Final			86.254	60.379	73	75	72					
Initial			80.856	55.000	73	74	71					
Difference	4	0.90	5.398	5.379	73	75	72	73	9	15	1.001	1.534
Final			91.413	65.527	73	75	72					
Initial			86.254	60.379	73	75	72					
Difference	5	1.20	5.159	5.148	73	75	72	74	8	8	1.000	1.730
Final			64.469	38.662	68	67	66					
Initial			57.726	32.031	67	66	66					
Difference	6	2.00	6.743	6.631	68	67	66	66	8	15	1.009	1.724
									Average		**1.002**	**1.704**

Stack Temperature Sensor Calibration

Meter Box # : CM30 *Name :* SVD

Ambient Temperature : 66 °F *Date :* October 15, 2014

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : August 7, 2012

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

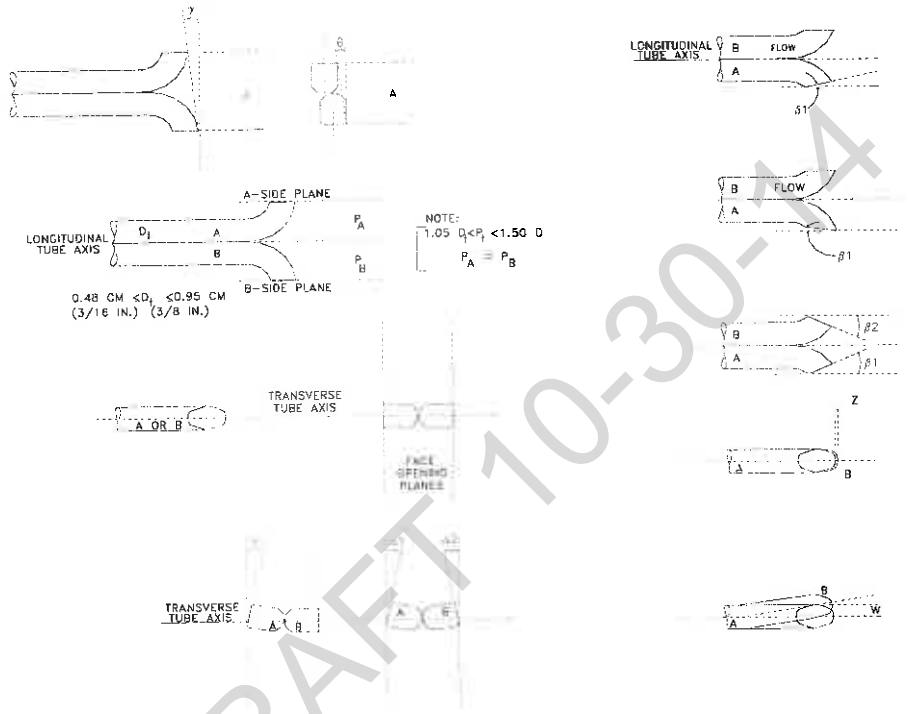
Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	3	0.7
250	252	0.3
600	602	0.2
1200	1202	0.1

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 123 Date: 9/2/2014 Inspector's Name: AHAS

Type of Probe: (circle one) M2 M5 M17 Probe Length: 11 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 4 ° (<10°), a_2 = 4 ° (<10°) z = A sin g = 0.049 (in.); (<0.125 in.)

b_1 = 2 ° (<5°), b_2 = 1 ° (<5°) w = A sin q = 0.016 (in.); (<0.03125 in.)

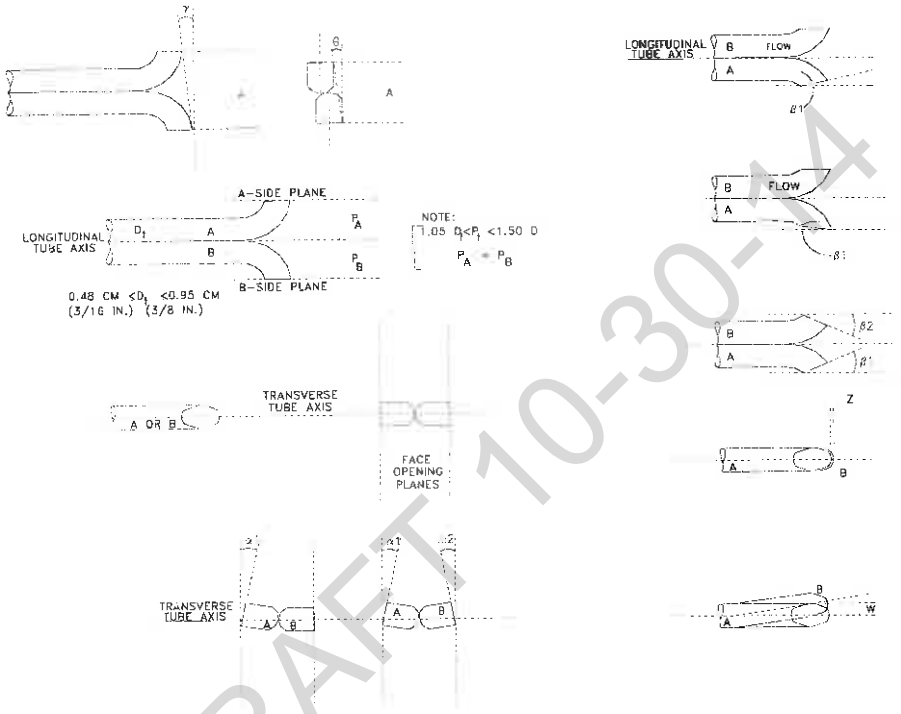
γ = 3 °, θ = 1 °, A = 0.929 (in.) P_A = 0.465 (in.), P_B = 0.465 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 170 Date: 9/19/2014 Inspector's Name: AMH

Type of Probe: (circle one) M2 M5 M17 Probe Length: 4 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 2 ° (<10°), a_2 = 2 ° (<10°) z = A sin g = 0.040 (in.); (<0.125 in.)

b_1 = 3 ° (<5°), b_2 = 1 ° (<5°) w = A sin q = 0.030 (in.); (<0.03125 in.)

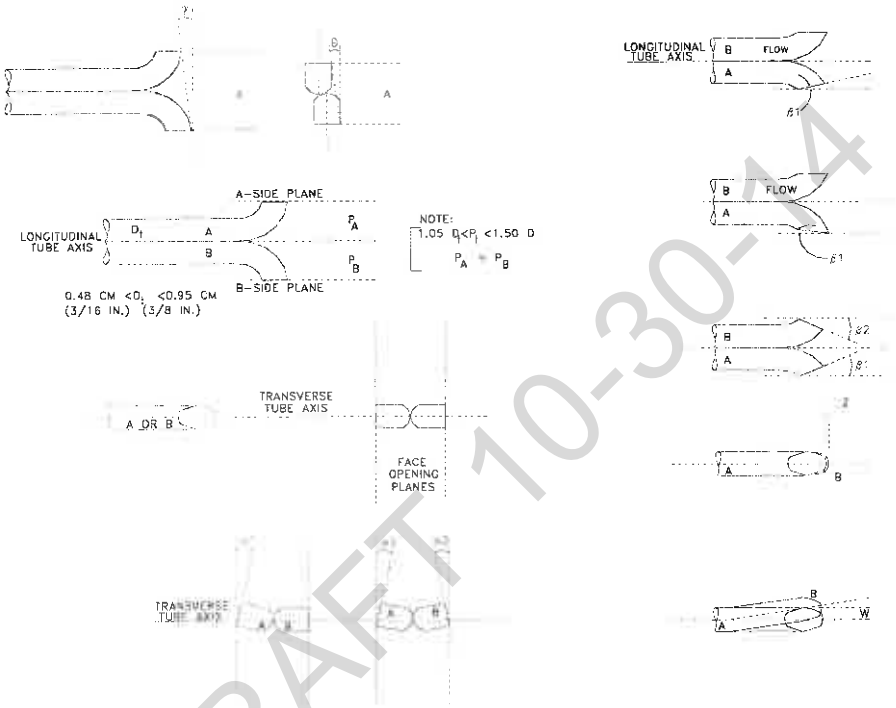
γ = 2 °, θ = 1.5 °, A = 1.140 (in.) P_A = 0.570 (in.), P_B = 0.570 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 170 Date: 10/13/2014 Inspector's Name: TFN

Type of Probe: (circle one) M2 M5 M17 Probe Length: 4 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 2 ° (<10°), a_2 = 1.5 ° (<10°) z = A sin g = 0.020 (in.); (<0.125 in.)

b_1 = 2 ° (<5°), b_2 = 1.5 ° (<5°) w = A sin q = 0.020 (in.); (<0.03125 in.)

γ = 1 °, θ = 1 °, A = 1.144 (in.) P_A = 0.572 (in.), P_B = 0.572 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

Nozzle Calibration Sheet
Teflon Set #7

Nominal Diameter	.120	.175	.200	.230	.275	.300	.310	.350	.375	.500	Other
Nozzle Diameter	.125	.175	.216	.232	.280	.301	.313	.365	.398	.520	.420
Nozzle Identification Number	4	6		8	9	10	1	12	13	#16	

WEIGHING SOLUTIONS INC.

SALES-SERVICE-RENTALS
3310-14 N. HARLEM AVENUE
CHICAGO, IL 60634

PHONE
773-836-2800
FAX
773-836-2891

CALIBRATION REPORT

Company Name MOSTARDI PLATT
Date SEPTEMBER 4, 2013
Location LAB
Weight Set # E 559

Model # E 0640
Serial/ID # G 045112105238
Manufacturer OHAUS
Tolerance ± 0.05%

Capacity 62 g
Readability 0.1mg

		Before Cal.:	After Cal.:
Weight # 1	0.1mg	0.0001 g	0.0001 g
Weight # 2	1 g	1.0000 g	1.0000 g
Weight # 3	10 g	10.0001 g	10.0000 g
Weight # 4	20 g	20.0002 g	20.0000 g
Weight # 5	50 g	50.0004 g	50.0000 g

	Accept	Reject
Linearity	✓	
Cornerload	✓	
Repeatability	✓	
Hysteresis	✓	

Comments Cleaned and adjusted calibration to N.I.S.T. specifications.

Technician

678
State Of IL Registration

STATE OF ILLINOIS
WEIGHING SOLUTIONS
NO. 1604
REGISTERED SCALE AGENCY

RLWS Mass Value CERTIFICATE

Contractor: **Weighing Solutions Inc**
PO Box 95
River Grove, IL 60171-0095

Purchase Order #: 1268
Client: **Weighing Solutions Inc**
Address: 3310 N Harlem Ave

City & State: Chicago, IL 60634
Date Received: 19 OCT 2012
Date Calibrated: 24 OCT 2012
Temperature Range: 21.41 to 21.72 °C
Pressure Range: 727.3 to 727.6 mmHg
Relative Humidity Range: 44 to 46 %
Air Density: 1.1406 to 1.1419 mg/cm³
Traceable Report #: 1927133
NIST Certificate #: 681/280058-10, 822/278785-10
Tested By: 12
Procedure: Modified Substitution (WI05-0023)
Contractor Req Recall Date: 2 Years
Primary Standard Calibration Date: 02/11/11, 10/21/09 **Due:** 02/11/15, 10/21/13
Description of Weights: 100 g. Polished Weight, 50 g to 5 kg Satin Finish Weights & 5-10 kg Satin Finish Grip Handle Weights, ASTM Class "2", Set S/N 5661
Although there are two NIST numbers, one or both may apply.

Nominal Value	Id.	Conventional Mass Corr. As Found (mg)	Conventional Mass Corr. As Left (mg)	Unc. K=2 (mg)	Tol. (mg)	Balance Used	Standard Set Used	Calibrated/due MM-DD-YY/MM-DD-YY	Assumed Density (g/cm³)
50 g		-0.118	**-0.118**	0.026	0.25	1183Q	K594Q	08-10-12/11-09-12	7.85
100 g		-0.143	**-0.143**	0.049	0.50	1183Q	K594Q	08-10-12/11-09-12	7.84
100 g	.	-0.221	**-0.221**	0.049	0.50	1183Q	K594Q	08-10-12/11-09-12	8.00
200 g		-0.020	**-0.020**	0.059	1.0	619Q	K594Q	08-10-12/11-09-12	7.84
300 g		-1.257	**-1.257**	0.086	1.5	619Q	K594Q	08-10-12/11-09-12	7.84
400 g		-1.326	**-1.326**	0.098	1.5	619Q	K594Q	08-10-12/11-09-12	7.84
1 kg		-0.57	**-0.57**	0.14	5.0	619Q	K594Q	08-10-12/11-09-12	7.84
1 kg	..	0.90	**0.90**	0.14	5.0	619Q	K594Q	08-10-12/11-09-12	7.85
3 kg		-5.83	**-5.83**	0.81	15	975Q	K594Q	08-10-12/11-09-12	7.84
5000 g		-0.8	**-0.8**	1.1	25	975Q	K594Q	08-10-12/11-09-12	7.84
10 kg	...	12.1	**12.1**	1.8	50	975Q	K594Q	08-10-12/11-09-12	7.84
10 kg	.....	16.1	**16.1**	1.8	50	975Q	K594Q	08-10-12/11-09-12	7.84

Check with your local state agency for certification of compliance on legal-for-trade items.

Prepared By:

RICE LAKE WEIGHING SYSTEMS
9001 REGISTERED
230 West Coleman Street • Rice Lake, WI 54868 • USA
TEL: 715-234-9171 • FAX: 715-234-6967

Dated 24 OCT 2012
Dan Demers Metrologist

RLWS Mass Value CERTIFICATE

Contractor: **Weighing Solutions Inc**
PO Box 95
River Grove, IL 60171-0095

Purchase Order #: 1268
Client: **Weighing Solutions Inc**
Address: 3310 N Harlem Ave

City & State: Chicago, IL 60634
Date Received: 19 OCT 2012
Date Calibrated: 23 OCT 2012 to 24 OCT 2012
Temperature Range: 21.00 to 21.79 °C
Pressure Range: 725.6 to 727.5 mmHg
Relative Humidity Range: 43 to 49 %
Air Density: 1.1381 to 1.1436 mg/cm³
Traceable Report #: 1927133A
NIST Certificate #: 681/280058-10, 822/278785-10
Tested By: 12
Procedure: Modified Substitution (WI05-0023)
Contractor Req Recall Date: 2 Years
Primary Standard Calibration Date: 02/11/11, 10/21/09 **Due:** 02/11/15, 10/21/13
Description of Weights: 1 mg to 100 g Polished Kit, ASTM Class "1", S/N E559

Although there are two NIST numbers, one or both may apply.

☒ Indicates As Found >= Tol

Nominal Value	Id.	Conventional Mass Corr. As Found (mg)	Conventional Mass Corr. As Left (mg)		Unc. K=2 (mg)	Tol. (mg)	Balance Used	Standard Set Used	Calibrated/due MM-DD-YY/MM-DD-YY	Assumed Density (g/cm³)
1 mg		0.0057	**0.0057**		0.0012	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
2 mg		0.0027	**0.0027**		0.0013	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
2 mg	.	0.0048	**0.0048**		0.0013	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
5 mg		0.0041	**0.0041**		0.0013	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
10 mg		-0.0017	**-0.0017**		0.0018	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
20 mg		-0.0018	**-0.0018**		0.0016	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
20 mg	.	-0.0022	**-0.0022**		0.0016	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
50 mg		0.0068	**0.0068**		0.0019	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
100 mg		-0.0056	**-0.0056**		0.0015	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
200 mg		-0.0029	**-0.0029**		0.0015	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
200 mg	.	-0.0022	**-0.0022**		0.0015	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
500 mg		-0.0072	**-0.0072**		0.0018	0.010	327Q	K594Q	08-10-12/11-09-12	7.95
1 g		-0.0225	**-0.0225**		0.0026	0.034	327Q	K594Q	08-10-12/11-09-12	7.95
2 g		0.0134	**0.0134**		0.0026	0.034	327Q	K594Q	08-10-12/11-09-12	7.95
2 g	.	0.0179	**0.0179**		0.0026	0.034	327Q	K594Q	08-10-12/11-09-12	7.95
5 g		0.0052	**0.0052**		0.0052	0.034	327Q	K594Q	08-10-12/11-09-12	7.95
10 g		-0.038	**0.000**	☒	0.012	0.050	676Q	K594Q	08-10-12/11-09-12	7.95
20 g		0.053	**0.053**		0.012	0.074	676Q	K594Q	08-10-12/11-09-12	7.95
20 g	.	-0.046	**-0.046**		0.012	0.074	676Q	K594Q	08-10-12/11-09-12	7.95
50 g		0.034	**0.034**		0.026	0.12	1183Q	K594Q	08-10-12/11-09-12	7.95
100 g		-0.289	**0.142**	☒	0.049	0.25	1183Q	K594Q	08-10-12/11-09-12	7.95

Check with your local state agency for certification of compliance on legal-for-trade items.

Prepared By:

RICE LAKE WEIGHING SYSTEMS
9001 REGISTERED
230 West Coleman Street • Rice Lake, WI 54868 • USA
TEL: 715-234-9171 • FAX: 715-234-6967

Dated 24 OCT 2012
Dan Demers Metrologist

State of Illinois

Department of Agriculture

Registration Number: 1604

Expires: 02/28/2014

Bureau of Weights and Measures

Registered Service Company Certificate of Registration

This is to certify that the named company has met all requirements for registration with this office for weighing devices.

Bureau Chief
Bureau of Weights & Measures

Issued To:

WEIGHING SOLUTIONS, INC.
3310-14 N HARLEM AVE
CHICAGO, IL 60634

Registered Technician - Registration Cards

STATE OF ILLINOIS
DEPARTMENT OF AGRICULTURE

Registered Technician:
0678 LITTLE, JAMES M

Registered Service Company:
1604 WEIGHING SOLUTIONS, INC.

Registered For:
Scale

Expires February 28, 2014

Registered Technician's Signature

The Department of Agriculture requires that all persons selling, installing, servicing, repairing, or reconditioning weighing or measuring devices used in trade or commerce be registered.

This Technician has met all of the qual ifications of the State of Illinois and is currently registered with the Illinois Department of Agriculture in good standing.

Bureau of Weights & Measures
Telephone (217) 785-8301

IL 406-1122 X021-406-0030

Pre/Post	Date	Time	Analyst	Ambient Temperature degrees F	Relative Humidity %	Barometric Pressure inches Hg	Calibration Standard 50.0000g	% Error	Calibration Standard 5.0000g	% Error	Calibration Standard 0.5000g	% Error
Pre	9/29/2014											
Post	9/29/2014											
Pre	9/30/2014											
Post	9/30/2014											
Pre	10/1/2014											
Post	10/1/2014											
Pre	10/2/2014	8:30 AM	JMG	73	31.0	29.26	49.9997 g	0.00	5.0002 g	0.00	0.5002 g	-0.04
Post	10/2/2014	3:00 PM	JMG	73	33.0	29.26	49.9997 g	0.00	5.0002 g	0.00	0.5002 g	-0.04
Pre	10/3/2014	8:30 AM	JMG	74	35.0	28.88	49.9999 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/3/2014	3:00 PM	JMG	75	30.0	29.03	49.9999 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Pre	10/6/2014	8:00 AM	JMG	72	28.0	28.88	49.9999 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/6/2014	3:30 PM	JMG	71	29.0	29.03	49.9999 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Pre	10/7/2014	7:00 AM	JMG	72	24.0	29.03	49.9999 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/7/2014	3:00 PM	JMG	74	37.0	29.29	50.0002 g	0.00	5.0000 g	0.00	0.4999 g	0.02
Pre	10/8/2014	8:00 AM	JMG	74	33.0	29.29	50.0001 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/8/2014	3:00 PM	JMG	74	33.0	29.29	50.0001 g	0.00	5.0000 g	0.00	0.5000 g	0.00
Pre	10/9/2014	8:00 AM	JMG	74	33.0	29.29	50.0002 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/9/2014	3:00 PM	JMG	74	37.0	29.29	50.0002 g	0.00	5.0000 g	0.00	0.4999 g	0.02
Pre	10/10/2014											
Post	10/10/2014											
Pre	10/13/2014	8:00 AM	JMG	70	31.0	29.23	50.0002 g	0.00	5.0000 g	0.00	0.4999 g	0.02
Post	10/13/2014	3:00 PM	JMG	74	37.0	29.29	50.0002 g	0.00	5.0000 g	0.00	0.4999 g	0.02
Pre	10/14/2014	8:00 AM	JMG	72	37.0	28.88	49.9997 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/14/2014	4:15 PM	JMG	72	36.0	29.03	49.9997 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Pre	10/15/2014	10:30 AM	JMG	72	36.0	29.03	49.9997 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Post	10/15/2014	10:45 AM	JMG	72	36.0	29.03	49.9997 g	0.00	5.0000 g	0.00	0.5001 g	-0.02
Pre	10/16/2014	7:30 AM	JMG	71	32.0	29.21	49.9999 g	0.00	5.0000 g	0.00	0.5000 g	0.00
Post	10/16/2014	3:30 PM	JMG	71	32.0	29.21	49.9999 g	0.00	5.0000 g	0.00	0.5000 g	0.00
Pre	10/17/2014											
Post	10/17/2014											

Balance ID OHAUS Model Explorer
S/N 1973

Date: 10/2/2014
Project #: M143903
Client: Joseph Behr and Sons, Inc

Facility: Rockford Facility
Location: Baghouse Inlet (TPU)
Operator: STS

Calibration Gases

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date	Final Bottle Pressure,	Mid cylinder % of high cylinder
CO2%	Zero	Zero Nitrogen	0.00	0.02	-0.11%	NEVER		
	Mid	CC430492	10.05	10.10	-0.27%	1/17/2022		53.74%
	High	CC17819	18.70	18.71	-0.05%	12/9/2021		
O2%	Zero	Zero Nitrogen	0.00	0.05	-0.23%	NEVER		
	Mid	CC430492	12.12	12.10	0.09%	1/17/2022		55.22%
	High	CC17819	21.95	21.99	-0.18%	12/9/2021		

Analyzer Data

Type	Model/Serial #
CO2 %	01449D/4385
O2 %	01449D/4385

CO2 % Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.05	10.10	10.13	0.02	0.01	0.02	10.12	3.80	3.8	-0.16	0.16	0.05	-0.05
2	10.05	10.10	10.10	0.01	0.01	0.01	10.10	4.32	4.3	0.00	0.00	0.05	0.00
3	10.05	10.10	10.10	0.01	0.05	0.03	10.10	3.61	3.6	0.00	0.00	-0.16	0.21

O2 % Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.12	12.00	12.09	0.05	0.01	0.03	12.05	15.40	15.5	0.05	0.41	0.05	-0.18
2	12.12	12.10	12.12	0.03	0.05	0.04	12.11	14.71	14.7	-0.09	0.09	-0.14	0.09
3	12.12	12.12	12.09	0.05	0.03	0.04	12.11	14.41	14.4	0.05	-0.14	-0.05	-0.09

Date: 10/2/2014
Project #: M143903
Client: Joseph Behr and Sons, Inc

Facility: Rockford Facility
Location: Baghouse Outlet (TPU)
Operator: STS

Calibration Gases

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date	Final Bottle Pressure,	Mid cylinder % of high cylinder
CO2%	Zero	Zero Nitrogen	0.00	0.02	-0.11%	NEVER		
	Mid	CC430492	10.05	10.10	-0.27%	1/17/2022		53.74%
	High	CC17819	18.70	18.71	-0.05%	12/9/2021		
O2%	Zero	Zero Nitrogen	0.00	0.05	-0.23%	NEVER		
	Mid	CC430492	12.12	12.10	0.09%	1/17/2022		55.22%
	High	CC17819	21.95	21.99	-0.18%	12/9/2021		

Analyzer Data

Type	Model/Serial #
CO2 %	01449D/4385
O2 %	01449D/4385

CO2 % Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.05	10.10	10.10	0.02	0.01	0.02	10.10	2.11	2.1	0.00	0.00	0.05	-0.05
2	10.05	10.10	10.10	0.01	0.01	0.01	10.10	2.42	2.4	0.00	0.00	0.05	0.00
3	10.05	10.10	10.10	0.01	0.05	0.03	10.10	2.90	2.9	0.00	0.00	-0.16	0.21

O2 % Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.12	12.00	12.10	0.05	0.03	0.04	12.05	16.91	17.0	0.00	0.46	-0.05	-0.09
2	12.12	12.10	12.12	0.03	0.05	0.04	12.11	16.45	16.5	-0.09	0.09	-0.14	0.09
3	12.12	12.12	12.09	0.05	0.03	0.04	12.11	16.12	16.2	0.05	-0.14	-0.05	-0.09

Appendix I - Gas Cylinder Certifications

Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI78E15A1066	Reference Number:	54-124414028-1
Cylinder Number:	CC430492	Cylinder Volume:	151.1 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12014	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jan 17, 2014

Expiration Date: Jan 17, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	10.05 %	G1	+/- 1.0% NIST Traceable	01/17/2014
OXYGEN	12.00 %	12.12 %	G1	+/- 0.8% NIST Traceable	01/17/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120405	CC184974	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016
NTRM	98051016	SG9163074BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 02, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Jan 15, 2014
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jan 14, 2014

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI59E15A3452	Reference Number:	54-124408657-4
Cylinder Number:	CC17819	Cylinder Volume:	159.0 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12013	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Dec 09, 2013

Expiration Date: Dec 09, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	19.00 %	18.70 %	G1	+/- 1.0% NIST Traceable	12/09/2013
OXYGEN	22.00 %	21.95 %	G1	+/- 0.7% NIST Traceable	12/09/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
CO2	06120405	CC184974	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016
NTRM/O2	09061411	CC268005	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Nov 19, 2013
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Nov 21, 2013

Triad Data Available Upon Request

Notes:

Approved for Release

END OF THE REPORT

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Thermal Process Units and TPU Baghouse PM and Lead Emissions Test Report

Behr Iron & Metal - Rockford, Illinois

R11379

October 17, 2014

APPENDIX B
TPU PROCESS OPERATING DATA

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TPU Process Operating Data
PM and Pb Emission Testing - October 2nd, 2014
Behr Iron & Metal - Rockford Facility

Test Run Times		PRODUCTION		DAMPERS (0-CLOSED; 1-OPEN)			TEMPERATURE READINGS (DEG F)						PRESSURE READINGS (IN H2O)			
Time	Test Runs	TPU-A(LB)	TPU-B (LB)	TPU-A	TPU-B	DRYER	CHAMBERA	CHAMBERB	SECONDARY	QUENCH	BAGHOUSE	EXIT GAS	TPU-A	TPU-B	SECONDARY CHAMBER	BAGHOUSE
9:10			1,198	0	1	0	618	435	1,568	405	366	257	0	0.01	-0.02	0
9:15			1,198													
9:20	Baghouse Inlet Run 1		1,198	0	1	0	581	674	1,729	459	361	277	0	-0.04	-0.1	0
9:25			1,198													
9:30			1,198	0	1	0	555	1,630	1,627	448	360	277	0	-0.03	-0.09	0
9:35			1,198	0	1	0	541	1,784	1,510	433	356	264	0	-0.03	-0.09	0
9:40			1,198	0	1	0	535	1,796	1,507	424	353	259	0	-0.04	-0.1	2.4
9:45			1,198	0	1	0	524	1,605	1,498	405	347	252	0	-0.04	-0.1	2.3
9:50			1,198	0	1	0	519	1,494	1,477	409	344	248	0	-0.03	-0.08	2.3
9:55			1,198	0	1	0	510	1,337	1,462	401	339	243	0	-0.03	-0.08	2.4
10:00			1,198	0	1	0	505	1,234	1,453	407	335	240	0	-0.03	-0.09	2.3
10:05			1,198	0	1	0	498	1,127	1,564	463	339	256	0	-0.04	-0.1	2.3
10:10			1,198	0	1	0	492	1,027	1,586	455	348	274	0	-0.03	-0.07	2.3
10:15			1,198	0	1	0	487	942	1,584	450	355	285	0	-0.03	-0.08	2.5
10:20			1,198	0	1	0	480	859	1,605	449	359	291	0	-0.02	-0.08	2.5
10:25			1,198	0	1	0	475	806	1,577	450	358	296	0	-0.03	-0.09	2.5
10:30			1,198	0	1	0	470	756	1,587	449	356	295	0	-0.03	-0.09	2.5
10:35			1,198	0	1	0	465	709	1,585	447	358	295	0	-0.03	-0.08	2.5
10:40		1,224		1	0	0	459	661	1,583	448	366	305	-0.02	0.1	-0.09	2.5
10:45		1,224		1	0	0	470	636	1,585	451	367	301	-0.02	0.11	-0.08	2.6
10:50		1,224		1	0	0	611	611	1,590	447	368	301	-0.01	0.11	-0.08	2.6
10:55		1,224		1	0	0	910	545	1,598	450	367	301	-0.02	0.08	-0.21	2.7
11:00		1,224		1	0	0	1,193	503	1,624	450	368	306	-0.01	0.02	-0.08	2.1
11:05		1,224		1	0	0	1,427	484	1,651	445	365	302	-0.01	0.02	-0.1	2.3
11:10		1,224		1	0	0	1,473	475	1,664	448	358	300	-0.01	0.02	-0.07	2.3
11:15		1,224		1	0	0	1,463	467	1,672	446	349	295	-0.02	0.02	-0.1	2.3
11:20		1,224		1	0	0	1,528	461	1,675	453	344	292	-0.02	0.02	-0.09	2.3
11:25		1,224		1	0	0	1,515	453	1,674	445	338	287	-0.01	0.01	-0.1	2.2
11:30		1,224		1	0	0	1,506	448	1,674	451	336	285	-0.01	0.02	-0.09	2.1
11:35		1,224		1	0	0	1,499	444	1,674	453	335	283	-0.01	0.02	-0.09	2.1
11:40		1,224		1	0	0	1,495	439	1,683	451	334	231	-0.01	0.02	-0.1	2.1
11:45		1,224		1	0	0	1,500	431	1,690	448	333	280	-0.01	0.02	-0.1	2.2
11:50		1,224		1	0	0	1,490	425	1,690	446	333	279	-0.01	0.02	-0.1	2.2
11:55		1,224		1	0	0	1,463	422	1,689	453	333	279	-0.01	0.02	-0.09	2.1
12:00		1,224		1	0	0	1,371	417	1,688	446	336	277	-0.01	0.02	-0.09	1.8
12:05		1,224		1	0	0	1,302	413	1,683	451	340	277	-0.01	0.02	-0.08	2.2
12:10		1,224		1	0	0	1,229	409	1,655	446	349	284	-0.01	0.02	-0.1	2.3
12:15		1,224		1	0	0	1,146	404	1,629	450	354	288	-0.01	0.02	-0.1	2.2
12:20		1,224	1,258	1	1	0	1,087	400	1,607	454	358	292	-0.01	-0.03	-0.08	3.4
12:25		1,224	1,258	1	1	0	1,022	533	1,578	465	371	311	-0.01	-0.03	-0.08	4.3
12:30		1,224	1,258	1	1	0	967	940	1,590	462	379	324	-0.01	-0.02	-0.08	4.8
12:35		1,224	1,258	1	1	0	917	1,290	1,614	463	384	332	-0.02	-0.04	-0.11	3.6
12:40		1,224	1,258	1	1	0	879	1,362	1,626	442	382	330	-0.01	-0.02	-0.06	3.2
12:45	Baghouse Inlet Run 2		1,258	0	1	0	847	1,419	1,740	434	375	316	0	-0.04	-0.09	1.7
12:50			1,258	0	1	0	826	1,472	1,652	432	370	298	0	-0.06	-0.12	1.2
12:55			1,258	0	1	0	816	1,515	1,522	429	365	284	0	-0.02	-0.07	1.1
13:00			1,258	0	1	0	816	1,511	1,463	407	358	275	0	-0.03	-0.09	1.1
13:05			1,258	0	1	0	816	1,516	1,693	425	351	273	0	-0.02	-0.08	1.9
13:10			1,258	0	1	0	811	1,517	1,800	454	347	280	0	-0.15	-0.23	1.4
13:15			1,258	0	1	0	807	1,557	1,575	434	343	277	0	-0.05	-0.1	1.3
13:20			1,258	0	1	0	801	1,468	1,442	420	337	268	0	-0.05	-0.12	1.3
13:25			1,258	0	1	0	773	1,305	1,503	411	327	259	0	0	-0.04	2.3
13:30			1,258	0	1	0	658	1,205	1,645	459	328	269	0	-0.06	-0.12	2.7
13:35			1,258	0	1	0	611	1,112	1,620	458	331	278	0	-0.05	-0.1	2.8
13:40			1,258	0	1	0	583	1,033	1,595	451	331	282	0	-0.02	-0.1	3
13:45			1,258	0	1	0	562	956	1,596	449	333	286	0	-0.05	-0.1	3.1
13:50			1,258	0	1	0	547	893	1,598	449	333	287	0	-0.04	-0.11	3.1
13:55			1,258	0	1	0	536	843	1,601	454	333	288	0	-0.06	-0.11	3.3
14:00			1,258	0	1	0	527	791	1,589	448	333	288	0	-0.06	-0.11	3.5
14:05			1,258	0	1	0										
14:10			1,258	0	1	0										
14:15			1,258	0	1	0										
14:20		1,212		1	0	0	449	673	1,616	453	328	278	-0.01	0.04	-0.1	3.3
14:25		1,212		1	0	0	649	682	1,603	457	339	383	-0.01	0.04	-0.12	3.5
14:30		1,212		1	0	0	725	683	1,598	445	330	284	-0.01	0.04	-0.1	3.6
14:35		1,212		1	0	0	1,040	684	1,602	447	330	286	-0.02	0.05	-0.08	2.8
14:40		1,212		1	1	0	1,322	644	1,621	450	334	283	0	-0.02	-0.06	3.6
14:45		1,212		1	1	0	1,399	607	1,540	466	348	296	-0.01	-0.08	-0.11	4.6
14:50		1,212		1	1	0	1,456	571	1,506	456	365	314	-0.01	-0.06	-0.11	4.4
14:55		1,212		1	0	0	1,407	540	1,517	450	367	320	-0.01	0.03	-0.13	3
15:00		1,212		1	1	0	1,497	506	1,603	444	361	310	-0.01	-0.01	-0.06	4.1
15:05	Baghouse Inlet Run 3	1,212		1	1	0	1,536	490	1,520	459	364	316	-0.01	-0.03	-0.1	4.3
15:10		1,212		1	1	0	1,458	475	1,478	452	364	323	-0.01	-0.04	-0.11	4.5
15:15		1,212		1	1	0	1,461	456	1,457	448	361	322	-0.01	-0.04	-0.1	4.7
15:20		1,212		1	1	0	1,482	441	1,450	451	362	323	-0.01	-0.04	-0.1	4.7
15:25		1,212		1	1	0	1,513	426	1,427	450	358	339	-0.01	-0.04	-0.11	4
15:30		1,212		1	1	0	1,562	409	1,422	450	365	365	-0.01	-0.05	-0.11	4
15:35		1,212		1	1	0	1,739	392	1,433	453	373	376	-0.01	-0.04	-0.11	4.1
15:40		1,212		1	1	0	1,777	383	1,444	453	378	381	-0.01	-0.04	-0.1	4.1
15:45		1,212		1	1	0	1,752	372	1,436	445	379	384	-0.01	-0.04	-0.1	4
15:50		1,212		1	1	0	1,656	361	1,420	448	381	386	0	0.01	-0.08	4.3
15:55		1,212		1	1	0	1,569	333	1,450	454	383	388	-0.02	0.01	-0.17	2.1
16:00		1,212		1	1	0	1,489	328	1,617	446	378	388	-0.01	0.02	-0.12	1.8
16:05		1,212		1	0	0	1,403	309	1,610	451	375	388	-0.01	0.02	-0.1	1.8
16:10		1,212		1	0	0	1,331	330	1,590	448	373	387	-0.01	0.02	-0.09	1.9
16:15		1,212		1	1	0	1,268	330	1,580	448	373	386	-0.01	-0.05	-0.08	3
16:20		1,212		1	1	0	1,208	307	1,550	360	377	386	-0.01	-0.05	-0.1	3.5

TPU Process Operating Data
PM and Pb Emission Testing - October 2nd, 2014
Behr Iron & Metal - Rockford Facility

Run No.	TPU Baghouse Inlet Duct Damper Positions			TPU Average Operating Data - Temperature (°F)						TPU Average Operating Data - Diff. Pressure (IN H2O)			
	TPU-A	TPU-B	DRYER	Chamber A	Chamber B	Secondary	Quench	Baghouse	Exit Gas	TPU-A	TPU-B	Secondary Chamber	TPU Baghouse
1	0	1	0	777	905	1,590	442	354	282	0	(0)	2	2.11
2	0	1	0	874	1,027	1,615	444	349	289	(0)	(0)	2	2.49
3	1	1	0	1,366	469	1,524	447	362	344	(0)	(0)	4	3.59
Average	1	1	0	1,005	800	1,576	444	355	305	(0)	(0)	3	3